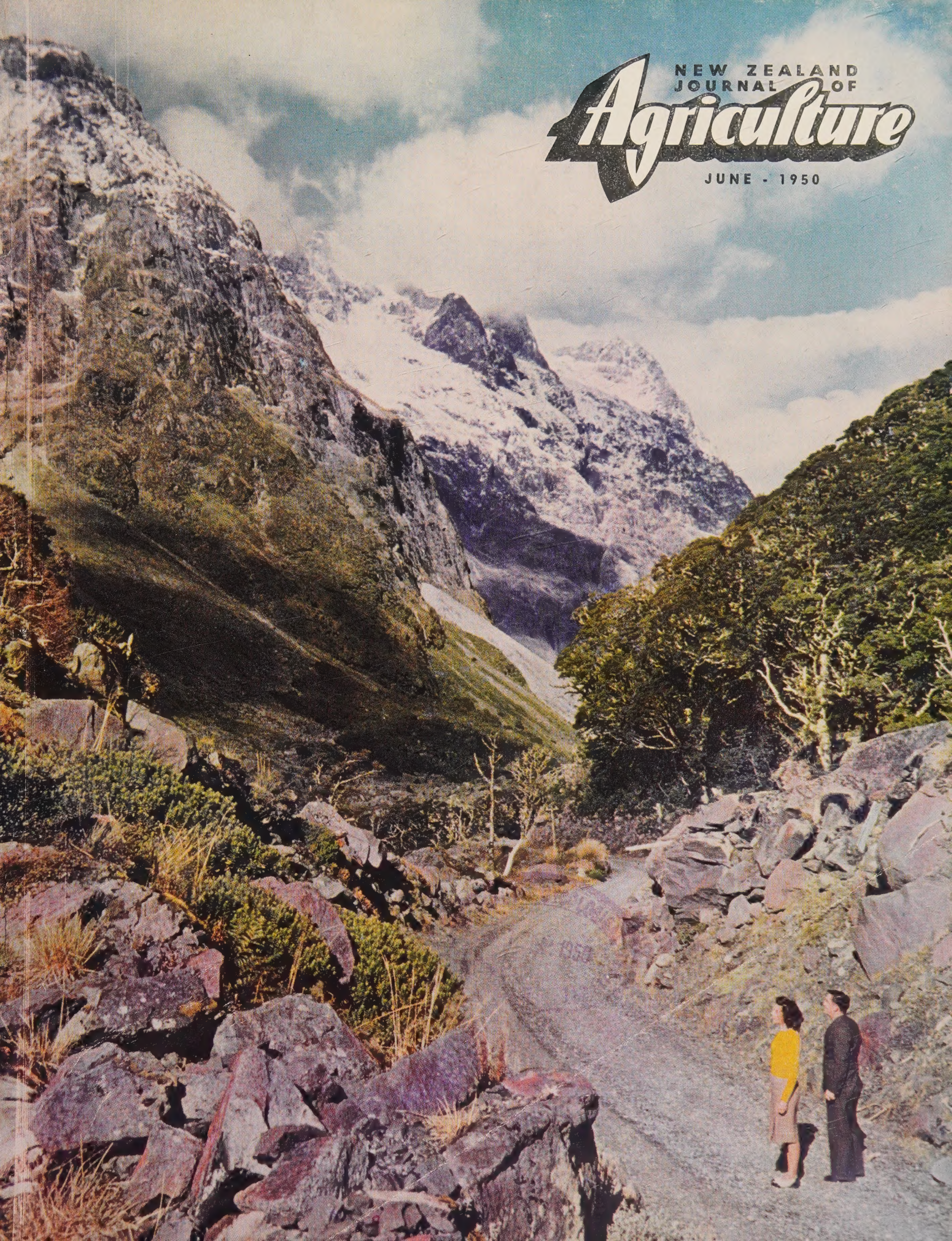
NEW ZEALAND JOURNAL OF Agriculture

JUNE - 1950



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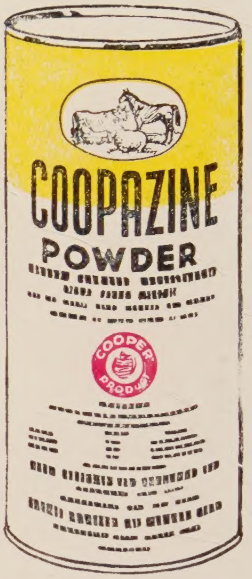

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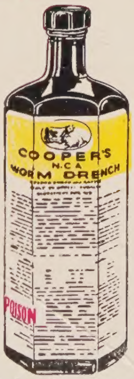

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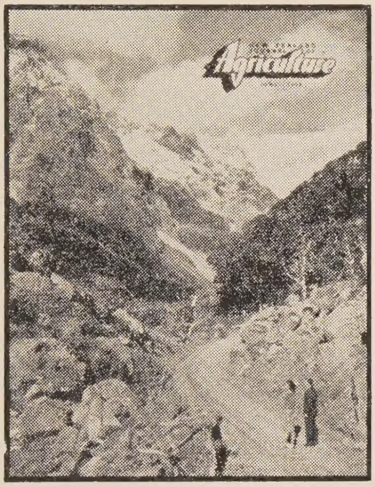
This month's cover



Scenery arresting in its grandeur is the subject of this month's cover, which has been reproduced from a natural-colour photograph by National Publicity Studios. The road is in the upper Hollyford Valley and is the gateway to New Zealand's Fiordland. Fiordland, with its magnificent alpine scenery, is still difficult of access, though a route, via the Homer Tunnel, connects with Milford Sound. The yet-incomplete tunnel is usually negotiated on foot, but vehicles have passed through it. Though the vast, rugged Fiordland is not suitable for development and hopes of finding economically important sources of minerals there have recently been dispelled, it is a region which for natural beauty has few equals.

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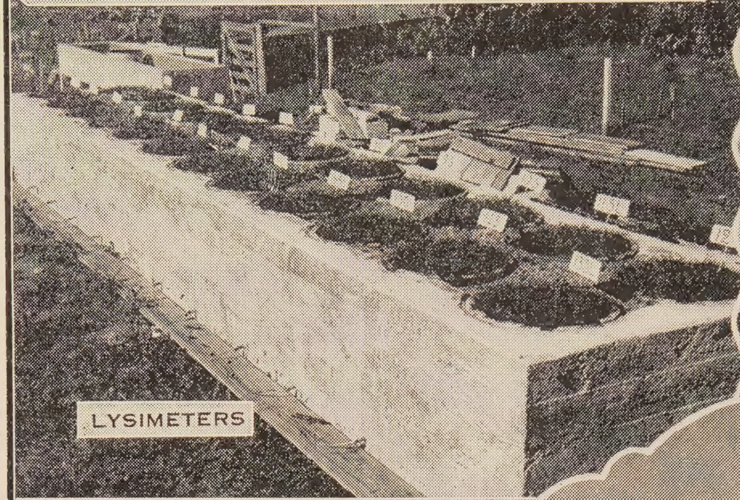
REGISTERED AT THE G.P.O., WELLINGTON, AS A MAGAZINE.

RUKUHIA SOIL RESEARCH STATION



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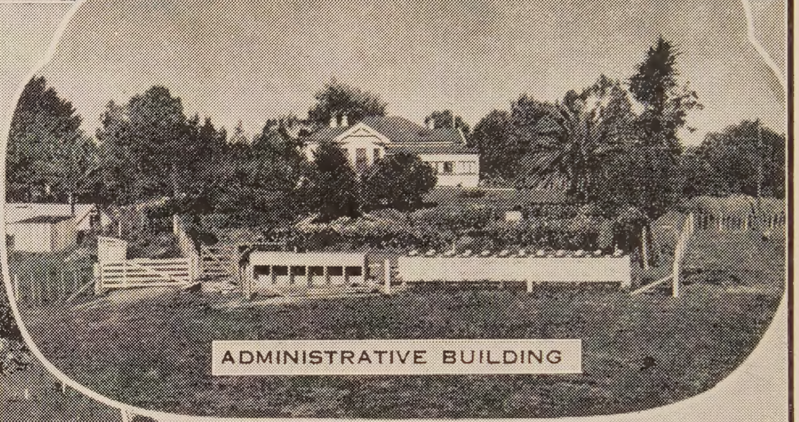

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CROP TRIALS

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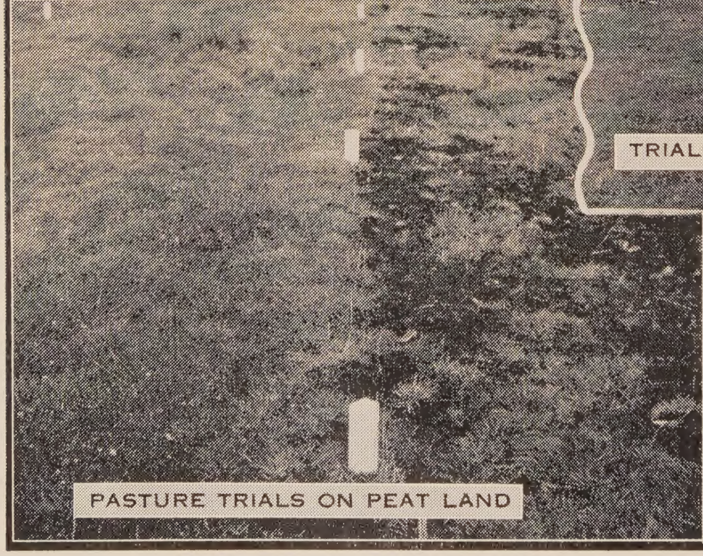


PASTURE TRIALS ON PEAT LAND

The Rukuhia Soil Research Station (Hamilton) services the Instructors in Agriculture of the Extension Division, Department of Agriculture, in soil fertility problems, develops techniques for field trials, and carries out a research programme in soil physics, soil chemistry, and biology. The station has already provided much useful information on the problems of soil moisture control, fertiliser and lime requirements of soils, and pasture establishment methods.

Legislation Affecting Agriculture Approved by Cabinet

IN conformity with the policy announced before the Government assumed office I have made a thorough examination of legislation affecting agriculture. A number of anomalies are apparent in present Acts and some additional legislation will be necessary. A schedule of legislation which I submitted to Cabinet has been approved for inclusion in the programme for the 1950 Parliamentary session.

The proposed legislative measures are directed generally toward greater protection of the farmer and the more effective working of the great industry on which we all directly or indirectly depend.

Complete revision of the Noxious Weeds Act is envisaged. Over the years of our farming history weeds have assumed an ever-increasing economic importance and some species in some areas have become so troublesome that the well-being of our agriculture has become seriously jeopardised. The revision of the Act will be accompanied by a much more realistic approach to the weed problem, which has become accentuated by the great advances in the methods and speed of international transport and the greatly increased traffic consequent on our position as a leading exporter of primary produce and a considerable importer of raw materials.

The mere placing of a weed species on the schedule of noxious weeds can no longer, if it ever did, combat the menace of weeds to our crops and pastures. One species which is to be dealt with immediately and drastically is water hyacinth. An immediate survey is to be made of the prevalence of this plant so that an earnest effort may be made to wipe it out at once. Experience overseas has shown that half measures are fatal with this menace to waterways, and apathy here could easily result in great deterioration in the drainage systems which are essential to the maintenance of the productivity of some of our rich lowlands reclaimed from swamps.

A more rigid inspection of imported grains and seeds is essential if new weed species are to be prevented from coming into the country. The Act must be so administered that repetition of the introduction of such a curse as Australia's saffron thistle, which came in with Australian fowl wheat two seasons ago, is impossible.

Nassella tussock is an outstanding example of the difficulty of controlling weed infestation. This insidious pest crept almost unawares on to some of our good pastoral country, and it was only when it had spread to an almost uncontrollable extent that it was suddenly realised how menacing it could become. A special Act was drawn up to try to control the pest, but to date this has merely proved an excellent example of shutting the stable door after the horse has gone. It is the avoidance of this type of happening that we are trying to achieve, and the new Act, coupled with additional quarantine regulations, should have this desired effect.

The revised provisions of the Act recognise that effective control of noxious weeds can be achieved only by local bodies undertaking the administration of the Act, but that some financial assistance by way of subsidy should be given by the Government. The provisions in the revised Act for improvement and simplification of the machinery of administration should do much to make weed control more effective.

Work done by officers of my Department and industrial firms with new weedkillers has shown the tremendous possibilities of materials that have been developed in recent years, especially hormone preparations. Development of hormone-type weedkillers will be encouraged to the greatest benefit of farmers. The Government believes that no bar should be placed in the way of the maximum advantage accruing to our industry from the application of new knowledge or services, but some measure of wise control is necessary. It is proposed, therefore, to seek power to control the sale of weedkillers by requiring preparations to be registered with the Department of Agriculture. For the protection of the user registration may be refused if the claim as to the efficacy of a weedkiller is extravagant or misleading or if the results claimed are not likely to arise from the use of the weedkiller under normal conditions in accordance with the instructions for use.

Provision which will be sought for the taking of samples and the analysis of weedkillers and for the publication of results of experiments with or analysis of weedkillers will ensure the use of only those materials which are likely to contribute effectively toward the effort to eradicate weeds. Those farmers with a genuine desire to maintain their pastures and crops free of the scourge of weed invasion will thus be assured of reliable information on the efficacy of various preparations for specific weeds and will be protected from the possibility of uneconomic applications and consequent damping of enthusiasm for the major effort that will be required.

Proposed revision of existing laws includes measures to ensure that only substances of value as fertilisers are sold under this name, alteration of the date for computing the return of sheep owned at April 30 to June 30 in each year, and regulation of the importation of fruit and plants to ensure the prevention of the introduction of new plant diseases and pests.

The foregoing summary is indicative of the very realistic attitude being adopted toward some of the major problems affecting agriculture. Legislation can be effective only if it is supplemented by a determination on the part of farmers to afford every opportunity for the operation of regulations framed for their advantage. I know the keen spirit that actuates my Departmental officers and we are together determined to remove any impediment to the working at maximum efficiency of the agricultural industry.

K. J. HOLYOAKE, Minister of Agriculture.

CARE OF LIVESTOCK DURING JULY

Contributed by the Animal Research Division.

WINTER FEEDING OF COWS

IT is imperative that cows should be well fed for 6 to 8 weeks before calving. They should have access to hay at all times and if the pasture is poor, they should also receive up to 20lb. of silage per day. Early-calving cows should be given about 2 hours' grazing per day on autumn-saved pasture and in addition should be fed as much silage as they will eat.

* * *

RINGWORM IN CALVES

Ringworm is sometimes troublesome, especially in poorly nourished calves. Before applying any remedy the scales should be removed by rubbing in a mixture of equal parts of soft soap and lard and scraping off the softened scabs the next day. The bare patches should then be dressed with an ointment consisting of 1 part of salicylic acid and 8 parts of lard or any registered stock remedy for ringworm which is available. As the infection can be transmitted to man, it is wise to wear rubber gloves when treating ringworm. In any case the hands and arms should be thoroughly washed immediately after the dressings have been applied.

* * *

ERGOTISM IN CATTLE

Hay made from ergotised grass will cause lameness and sometimes even loss of feet in cattle. The small black ergots which replace the seeds of ryegrass and other grasses can easily be seen and if they are present in large numbers, the hay should not be used. Similar trouble often occurs when cattle are grazed on tall fescue grass even when no ergots are present. This grass should be regarded as poisonous and should not be grazed by cattle.

* * *

PULPY KIDNEY IN LAMBS

Where pulpy kidney occurs in lambs under 6 weeks of age its incidence can be reduced by vaccinating the ewes before lambing. If ewes have never been vaccinated before, the best results will be obtained from 2 doses of vaccine given at least 1 month apart. Ewes which were vaccinated last year will require only 1 vaccination. The last (or the only) vaccination should be given about a fortnight before lambing and this can be done quite safely if ewes are handled carefully. Very poor immunity results where the ewes are vaccinated much earlier than this. If most losses from pulpy kidney occur in lambs over 6 weeks of age, vaccination of ewes is of no value, but vaccination of lambs at marking may help.

BLOOD POISONING IN EWES AND LAMBS

Losses from blood poisoning in lambing ewes and marked lambs appear to be increasing in some districts. These may be greatly reduced, if not eliminated, by vaccinating the ewes with blackleg vaccine about a fortnight before lambing. As the immunity which passes from the ewe to the lamb in the first milk does not persist for many weeks, lambs should be marked early. To obtain the best results it may be necessary to divide the ewes into early and late lambers which should be vaccinated separately to ensure that all ewes are vaccinated 10 to 20 days before lambing. Advice concerning vaccination can be obtained from any office of the Department of Agriculture. Where possible, ewes should lamb in clean, spelled paddocks and lambs should always be marked in clean, temporary yards.

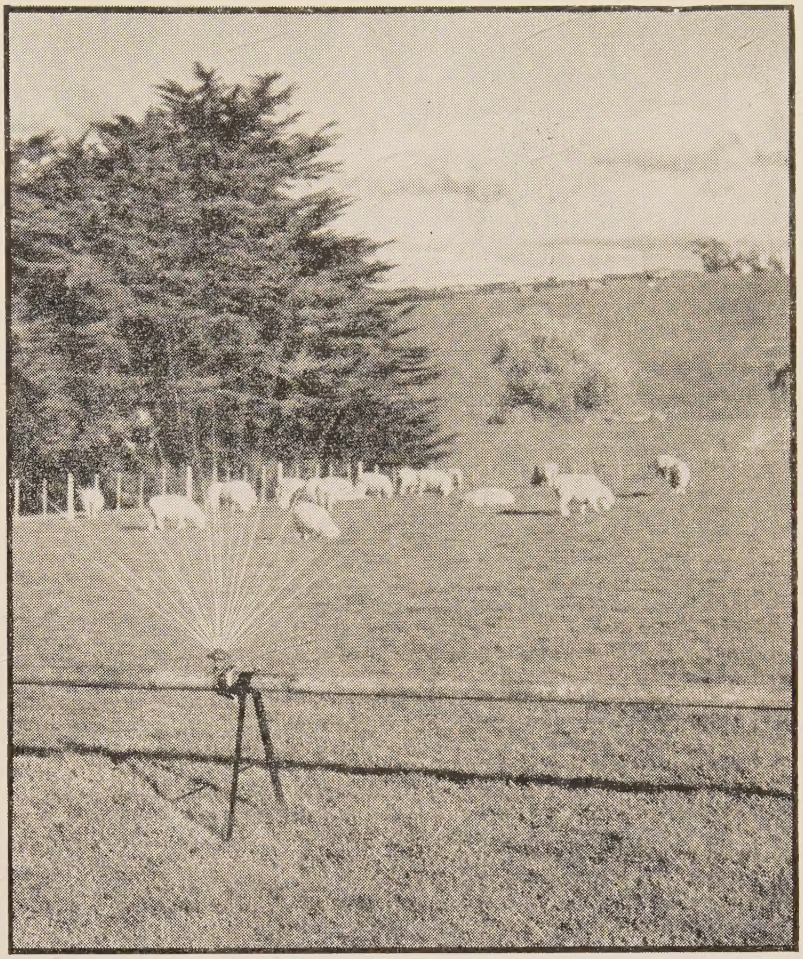
* * *

SLEEPY SICKNESS IN EWES

Heavy losses from sleepy sickness sometimes occur in ewes carrying twins or heavy single lambs. These losses may be prevented by ensuring that ewes do not suffer a check just before lambing. If necessary, they should be divided into early and late lambers and drafted on to the best feed available 3 to 4 weeks before lambing. Research at the Ruakura Animal Research Station has shown that poor feed for 6 weeks before lambing can reduce the fleece weight by more than ½lb.

Overhead-spray Irrigation on Pasture Land

IN the lower-rainfall areas of the South Island, such as exist in Otago and Canterbury, much attention has been given to irrigation. The rainfall over much of the North Island is fairly high, varying from 40 to 60in., and prolonged droughts such as are common in the low-rainfall areas of Australia do not occur, so little attention has been paid to the subject of irrigation in the North Island. During the past 2 years the use of overhead sprays on pasture has been under investigation at the Rukuhia Soil Research Station, Hamilton, the idea underlying the work being to determine if irrigation by overhead spray of, say, 10 to 15 per cent. of the area of a dairy farm is economic. In most years such an area of irrigated pasture would enable farm production to be maintained throughout drought periods. Results of the work to date are summarised in this article by H. E. Annett, Field Research Officer, and P. Noble, Research Officer, Rukuhia Soil Research Station, Department of Agriculture, Hamilton. Information obtained from the experiments should also be valuable to horticulturists and vegetable growers whose production suffers because of insufficiency of water.



EACH year farm production in New Zealand suffers to some degree because of variations in annual rainfall and insufficient rain at critical periods. For such reasons dairy production falls in bad seasons by 20 per cent. or more. Some farmers on 100-acre farms suffered a loss in returns of £500 or more in the 1945-46 season, and in most years bad distribution of rainfall causes a loss to such farmers of at least £200. Sheep farmers have been affected at least as severely, and the ravages of facial eczema in drought years are likely to be serious.

The thoughts of some farmers have turned to irrigation, and one farmer near Hamilton has irrigated his dairy pastures with great success since 1932, following the South Island practice of irrigation by flow and pumping the water from the Waikato River. However, the use of overhead sprays has developed greatly in overseas countries.

Surface or Flow Irrigation

Where water is plentiful and can be led on to the land by gravity from a higher level, flow irrigation is the logical system. However, it entails preliminary grading of the land and the formation of ditches. Removal of surface soil reduces the fertility of the areas graded.

Apart from the expense involved, the ditches interfere with farming operations and occupy land which could be used for pasture or other crops. Under certain conditions flow irrigation gives rise to erosion. For efficient watering from flow irrigation at least 2 to 3in. per acre is necessary, which is far more than can be absorbed in the top 4in. of soil, much of it passing to much lower depths where, though it is useful for certain crops and fruit trees, it is lost to the roots of pasture plants. Experiments at the Soil Research Station show that in a ryegrass-white clover pasture on the Hamilton clay loam moisture below 4in. from the surface is of little use to the roots, though on a lighter soil type and a different type of pasture that might not apply.

Overhead-spray Irrigation

Where water must be pumped from wells or from a stream or dam below the level of the soil to be irrigated power must be used and paid for. In such cases waste of water is waste of money, and overhead-spray irrigation provides an economic answer. This system can be used on flat or sloping ground and no labour is required for grading and making channels. The spray soaks into the surface and there is little danger of erosion. Any desired quantity of water—½in., 1in., or more per acre—can be applied readily. The system is ideal for pasture growth, as only the surface few inches need to be kept moistened. The labour required probably is less than that needed for surface irrigation.

Spray irrigation has developed rapidly in many overseas countries, and in the United States of America is used in numerous areas. F. W. Peikert in "Agricultural Engineering," 1948, states that portable-pipe irrigation is gaining acceptance from coast to coast in the U.S.A. even on comparatively level land and has been found profitable even in regions of high rainfall. He adds that it can be used also for fertiliser application during the growing stage of a crop and as a protection against frost. A Melbourne farmer has obtained good results with such equipment in combating frosts.

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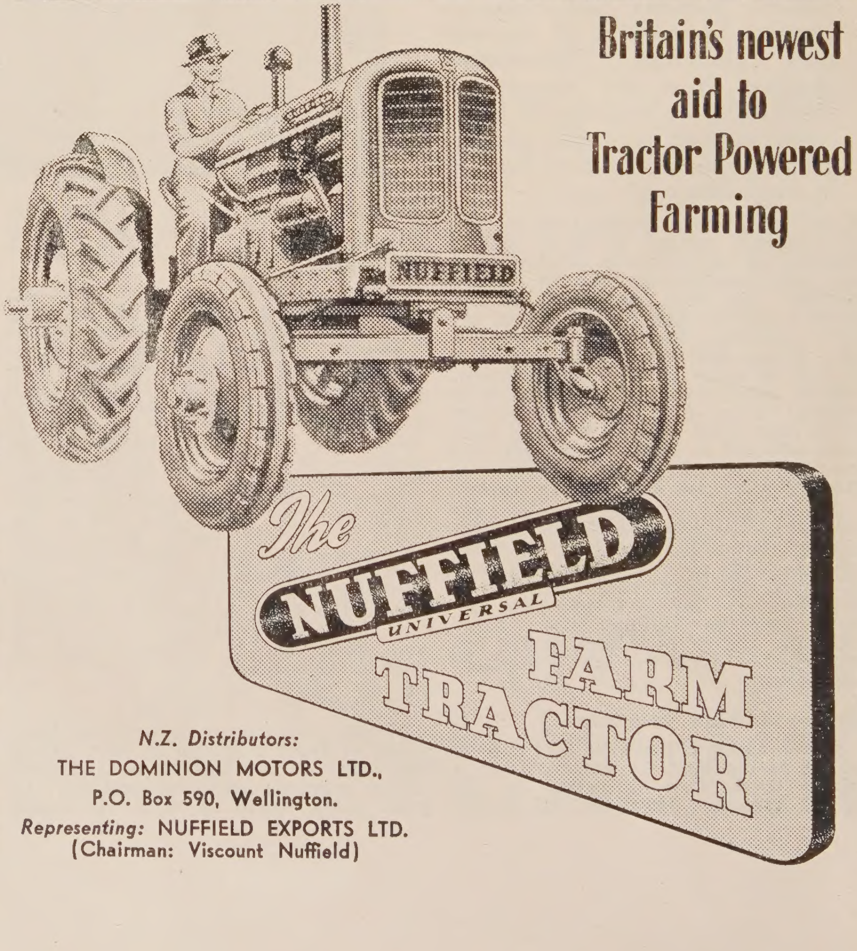
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Great increases are reported in dairy production from pasture even where the rainfall reaches 50in. a year. Annual operation costs of portable-pipe systems with rotating sprinklers are given as £5 per acre. The labour required averages about 2 man-hours per acre for each irrigation of 2in. Capital costs vary from £12 to £25 per acre.

Two Types of Spray

Overhead-spray irrigation equipment may be divided broadly into two types—revolving sprays and movable spray lines.

Revolving Sprays

There are various types of revolving sprays. One type made in California will shortly be made in Australia, and an English firm makes a very efficient type which was demonstrated in New Zealand recently. Different models irrigate from one position areas from 1/5 acre up to more than 2 acres. Revolving sprays require little labour, but need pressures of up to 90 to 100lb. per square inch, involving high cost of equipment and charges for power.

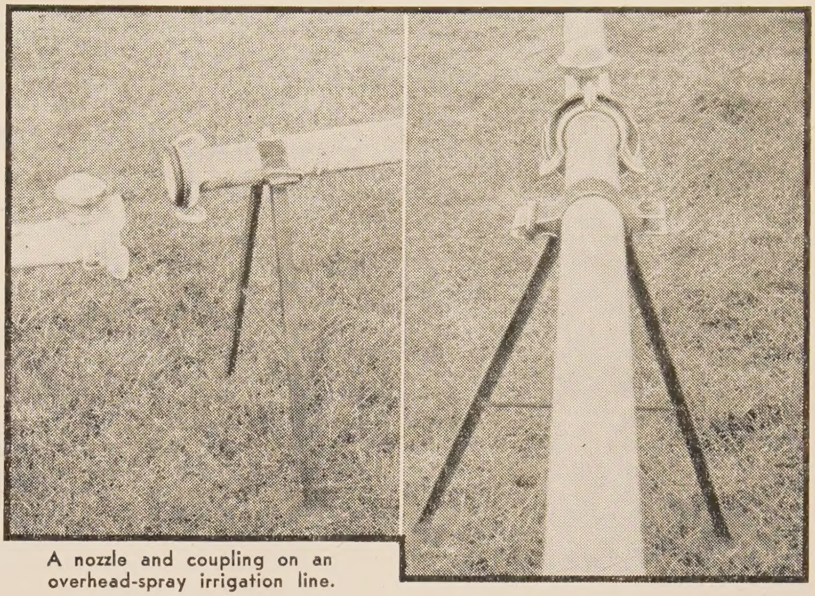
A new development of revolving sprays in Australia has a battery of four sprays, each covering 1 acre, which operate in succession. When the pump is switched on the first spray cuts in automatically and makes a complete revolution in 3 minutes, after which it cuts out and the second spray starts. When the fourth spray cuts out the first spray cuts in again, and the process carries on until the desired amount of water has been applied. This method requires the minimum of attention.

Movable Spray Lines

Overhead sprays fed by movable spray lines are in common use in Australia. The capital cost of the system is less than that of revolving sprays, and as the system works at lower pressures—25 to 30lb. per square inch—the capital cost of the pump and charges for power are much less. As the spray heads are closer together, the water distribution is affected by wind less than that from revolving sprays. Labour is required frequently to move the pipes to new positions, but even with revolving sprays someone has to be on hand to move the sprays.

A typical movable spray-line system consists of the pumping and power plant, the delivery main, and spray-line piping. Almost invariably a centrifugal pump is the most satisfactory. A control valve must be fitted on the delivery side of the pump to allow regulation of the quantity of water delivered. A centrifugal pump delivers its maximum volume of water when developing low pressure, the discharge decreasing as the pressure head increases. Therefore the pump would discharge varying volumes of water as the pressure varied, and such variations would occur when the pump discharged into a pipeline which increased in height. The control valve overcomes this trouble.

The water is delivered from the pump into the main pipe. This may be of asbestos and buried in the ground or, if it is required to be moved, of the portable variety similar to the spray lines. Such pipes are made of 22-gauge galvanised iron in lengths of about 17½ft. The pipes are provided with special couplings so that they can be coupled or uncoupled quickly; most systems have couplings which enable the joints to be bent through an angle of about 13 degrees in any direction. The pipes are frequently mounted on stands.



A nozzle and coupling on an overhead-spray irrigation line.

Spray nozzles are of various types, each maker usually having a different pattern. Where the water contains sediment the butterfly type is often used; in it a jet of water from the pipe impinges on a small, curved piece of metal mounted in a bearing, causing the metal to revolve and the water to be scattered around in a spray. A common type has a mushroom-shaped head pierced with holes. One popular form sprays in the shape of a square by a special arrangement of the holes; it is made in three sizes designed to spray 6, 8, or 12 gallons per minute, providing 1in. of artificial rain in 105, 80, or 55 minutes respectively at a working pressure of 15lb. per square inch. Such sprays are placed 35ft. apart, each covering an area of 35ft. square. To supply 1in. of artificial rain requires 23,000 gallons of water per acre.

In Australia pieces of rubber pressure tube about 11in. long have been tried in place of the metal sprays. The rubber has a spiral cut round it. One such spray tried at the Soil Research Station provided far better distribution of water than any other spray tried and threw water a greater distance. Further, sediment cannot block it and it is far cheaper than a metal spray.

Plant Installed at Rukuhia

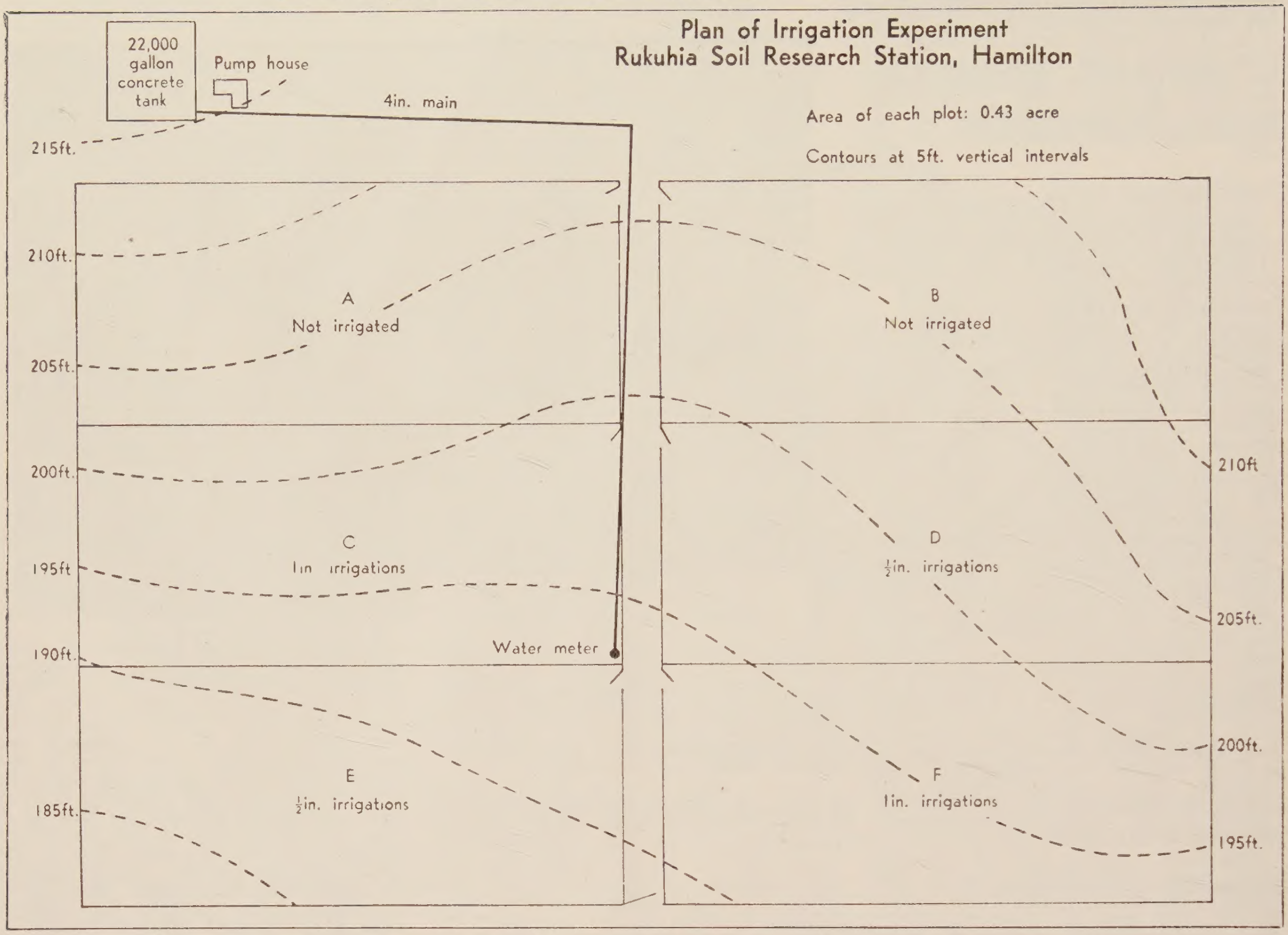
A number of makes of spray-irrigation plant are in use in Australia, all of about equal merit, and one such system has been installed at the Soil Research Station. The spray pipes are 17½ft. long, of 3in. bore, and made of 22-gauge galvanised iron. A spray head is inserted at every second joint, the heads thus being 35ft. apart. The main pipe is of the same dimensions, and every 105ft. is inserted an outlet to which a special hydrant is attached; the first outlet, however, is only 52½ft. from the paddock fence where the main line enters. Each outlet enables the spray line to be used in six positions, three on each side of the main. The spray pipe can be used opposite the hydrant at right angles to the main, or by using two lengths of 3in. connecting pipe it can be moved to positions 35ft. on each side of the first; this brings the inside position to 17½ft. from the fence, as the two connecting pipes make up 35ft. and the first outlet is 52½ft. from the fence.

While one spray line is working a second spray line can be placed in position from another hydrant. The water can be turned on and off at each hydrant as required. The pipes are easily movable, weighing only 10 to 15lb. each, complete with stand. The equipment had been in use in wartime when the area was used for vegetable growing.

Water is delivered into the pipes at 50lb. per square inch pressure. Visitors have doubted the ability of the pipe to withstand such a pressure, but similar pipes tested in Australia stood up to the following pressures; 3in. pipe, 170lb. per square inch; 4in. pipe, 150lb.; and 5in. pipe, 130lb. However, such a high pressure as 50lb. is unnecessary, as 20 to 25lb. is ample to provide efficient sprays. The life of such pipes is said to be 10 to 15 years in Australia.

Size of Pipe

The diameter of the main and spray lines has a considerable effect on the frictional resistance. If a 3in. pump delivering 15,000 gallons of water per hour causes water to flow along a pipe 5in. in diameter and 1 chain long, the frictional loss is equivalent to lifting the column of water 2ft.; for a 4in. pipe the figure is 4ft., and for a 3in. pipe the additional head is 18ft. per chain—that is, the frictional resistance of a 4in. pipe is far less than that of a 3in. one. For agricultural work in



which relatively long lines of main and spray lines are used, 4in. diameter pipe is much preferable, but for the irrigation of small farms 3in. spray line is satisfactory. Under the same pressure head the discharge of water from a 3in. pipe is only half that from a 4in. pipe. For these reasons 4in. piping has become practically standard for spray irrigation in Australia.

The terms "pressure" and "head" mean the same thing expressed in different ways. Pressure refers to the pressure exerted in pounds per square inch of a column of water, whereas head refers to the height of the column of water causing that pressure. The pressure of a column of water 2.31ft. high is 1lb. per square inch. Therefore pounds per square inch is converted to head in feet by multiplying by 2.31; a pressure of 50lb. means the same thing as a head of water 50 x 2.31 = 116.5ft. Similarly, head in feet is converted to pounds per square inch pressure by dividing by 2.31; water in a tank 116.5ft. above ground level exerts a pressure of 116.5 ÷ 2.31 = 50lb. per square inch.

Centrifugal pumps are most commonly used for spray irrigation. The choice of pump depends on the amount of water per hour required. A 1½in. pump supplies about 3600 gallons per hour, a 2in. pump 5400 gallons, a 3in. pump 12,600 gallons, and a 4in. pump 19,500 gallons.

The horsepower required to work the pump depends on the amount of lift and the frictional losses in the pipe. Proper engineering advice should be sought about the power required for each installation. Barometric pressure of the air will lift water only 34ft. and, because of frictional losses, this is not obtained in practice. A centrifugal pump should not be expected to lift water from more than 20ft., but where possible 15ft. should not be exceeded.

Where electricity is not available, an old motor-car engine can be used for motive power. In Australia many farmers use their tractors, and one installation irrigating 150 acres was making use of a 38-h.p. diesel engine.

Experimental Work at Rukuhia

During the war the area now occupied by the Soil Research Station at Rukuhia was used for vegetable growing for the armed forces and part of it was irrigated by revolving sprays. A well had been sunk to 180ft. and was stated to deliver 3000 gallons of water per hour. A concrete storage tank of 22,000 gallons capacity was built, and from this a 4in. asbestos pipe laid underground led water to the area to be sprayed. The water could be delivered by a booster pump at a pressure of 50lb. per square inch.

When the area was taken over by the Soil Research Station it was ploughed and on April 2, 1946, was sown with a mixture of 25lb. of Certified perennial ryegrass, 6lb. of cocksfoot, 5lb. of Italian ryegrass, 3lb. of Montgomery red clover, and 2lb. of white clover per acre. No manure was sown with the seed, as the land was considered to have been so heavily fertilised previously for vegetables that no extra manuring was needed.

For the irrigation experiments an area of slightly less than 3 acres served by the 4in. pipe mentioned was selected. This was divided into six plots each of 0.43 acre, three on each side of a central race, as in the plan on this page. The soil type in the main is Hamilton clay loam with some admixture of Ohaupo silt loam. The plots are on undulating land sloping gradually away from the unirrigated plots, which were chosen at the highest point to avoid seepage effect. The 4in. asbestos pipe was tapped with a 2in. galvanised-iron pipe leading into a water meter which records flows up to 7000 gallons an hour with an accuracy of 98 per cent.

From the meter, mains of 1¼in. piping were laid and provided with spray lines fitted with sprays at 15ft. intervals. By means of gate valves and rubber hose fitted with special connections a very efficient system of overhead spraying was produced.

The spray lines were 76ft. long and of 1¼in. piping, so the work of moving them was cumbersome for two men. An up-to-date Australian type of spray line was installed recently, so there is no point in describing the original layout fully, but with the system at the station four plots could be irrigated within 2 working days, two plots receiving 1in. of water and the other two ½in. of water per acre. The total area irrigated was about 1¾ acres.

No manuring was given until September 3, 1948. The two unirrigated and the four irrigated plots then received 3cwt. of serpentine superphosphate and 1 ton of limestone per acre.

Objects of Experiments

The experimental work was directed toward gaining information on the following points, which all have a practical interest:—

What quantity of water per acre should be applied at each irrigation and how frequently should irrigations be applied?

On sloping land consisting mainly of Hamilton clay loam the application of more water than the surface soil could absorb readily was considered unwise. Excess water would run off and cause scouring and would involve waste of pumping charges. Accordingly plots C and F received 1in. and plots D and E ½in. of water at each irrigation. Plots A and B were not irrigated. Pasture wilts on this soil when the moisture content of the surface 4in. falls below 20 per cent. The maximum water-holding capacity of the soil is about 75 per cent. Irrigations were timed to try to keep the moisture content in the top 4in. at least 35 per cent.

What is the moisture content of unirrigated soil throughout the year and how is this affected by irrigation at the two rates applied?

The water content of the soil on each plot was determined frequently. Many measurements were taken of the soil moisture in every 4in. layer down to a depth of 3ft., but more frequent determinations were made of the moisture content of the top 4in. and of the layer from 4 to 8in. deep.

To what extent does irrigation affect the type of pasture on the plots?

Regular estimations were made of the amount of grasses, clovers, and weeds on each plot.

What increase in growth and carrying capacity can be obtained by spray irrigation throughout the year and particularly during drought periods?

What would be the approximate cost of installing a suitable spray-irrigation system under New Zealand conditions?

Number of Irrigations

To complete the irrigation on all the plots took 3 or more days at first because of necessary adjustments to the plant. Later it was found possible to complete a round of irrigation within 2 days.

Irrigations were started on the following dates:—

Month	1947	1948	1949
January	8 21 27	13 21 28	11 24
February ..	6 13 25 28	9 18 25	2 15
March	4 16 17 20	Nil	1 17
November ..	6 26	Nil	Nil
December ..	12 29	21 27	Nil

Effect on Moisture Content

Large numbers of moisture-content estimations were made throughout the season in the soil of the irrigated and unirrigated plots. Measurements were made in every 4in. layer down to 3ft. These have provided data for a study of soil moisture, but the results are too technical to include in this article. However, it is of interest that in this soil plants wilt when the moisture content falls to 20 per cent. and the soil is saturated when it contains 65 to 70 per cent. of water. It appears that plants make most growth when the soil-moisture content is about half-way between wilting point and saturation —say, 40 per cent. of water in this case.

During the dry period in February and March, 1947, the moisture content in the unirrigated plots fell as low as 13 per cent., a long way below the wilting point. The pasture turned brown, in common with pasture on the similar soil type in the district. Yet at a depth of 4 to 8in. the soil-moisture content was well above wilting point, and at 8 to 12in. water was ample for plant growth. Therefore, on the Hamilton clay loam the pasture must have ample moisture in the top 4in. of soil and soil moisture below this depth is of little use to it. During the dry period the green pasture on the irrigated plots made a striking picture in the otherwise brown landscape.

In general, results showed that in a warm, dry summer the Hamilton clay loam would require irrigation at 7- to 10-day intervals for maximum growth.

Effect on Botanical Composition

The area on which the experimental plots were established was sown down originally with the same pasture mixture as the rest of the research station. Since January 27, 1947, the percentages of grasses, clovers, and weeds have been determined at approximately monthly intervals. Samples were taken when the plots were mown for determination of the amount of pasture growth, and the species were hand separated, dried, and weighed. The general results are outstanding.

During and immediately after each hot, dry summer season the ryegrass and particularly the clovers fell to very low proportions on the two unirrigated plots and the weed content rose to a very high figure—frequently 80 to 90 per cent. The weed content on the irrigated plots decreased steadily from the beginning and the clover and ryegrass content was maintained. In 1947 and 1948 plots A and B received no irrigation, plots C and F received 1in. per acre in each watering, and plots D and E ½in. The weed content of plots D and E (½in. waterings) always tended to be higher than that of plots C and F (1in. waterings), which rarely contained more than 1 per cent. of weeds.

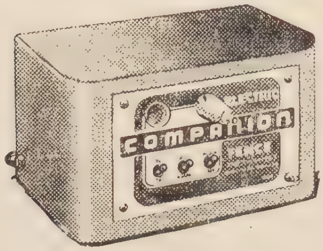
Those facts point the way of attack on the general problem of weeds in pasture. During the dry summer period clovers die, ryegrass also suffers, and the turf becomes very open, providing an opportunity for the spread of weeds when the next rain falls. However, if the surface soil contains an optimum amount of water, the grasses and clovers persist and form a dense sward which gives no opportunity for weeds to take possession.

On the plots at the station there was a further complication. During hot, dry summer weather the irrigated plots (each less than ½ acre) were carrying 80 to 100 wethers at each grazing. The dried-up unirrigated plots carried practically no stock at this period, and so received far less animal manure and less treading, which gave the weeds every opportunity for growth. Pennyroyal, a common weed of the area, became well established on the unirrigated plots, for though sheep will eat most weeds they will not touch pennyroyal once it has begun to throw up its flowering stems. In the dry period up to 90 per cent. of the growth on the unirrigated plots was pennyroyal.

It has been the practice at the station to use wethers as one means of measuring the pasture growth on the plots. The plots are spelled for a time and then grazed with wethers and the number of grazing hours per plot is recorded. Frequently the grass becomes a little longer than it would under ordinary methods of sheep grazing, and it became evident that under such conditions pennyroyal could not be controlled on the unirrigated plots and the use of these plots as a comparison with irrigated plots would be unfair.

Therefore the plan of experiment was modified in December, 1948, and since then the previously unirrigated plots A and B have come under irrigation. They each receive 1in. of water at each irrigation, whereas plots D and E, which previously received ½in., now receive 1½in. at each watering, and plots C and F, which formerly received 1in. at each watering, now receive 2in. During the summer of 1948-49—a few months after the change—the weed content of plots A and B diminished rapidly; since then the weed content has fallen steadily, and now these plots are almost up to the standard of those which have been under irrigation constantly.

Pennyroyal, the main weed on plots A and B during the dry spell, is usually associated with wet land. Its deep roots enable it to draw water from lower levels, so it was able to make good growth during the drought. However, when the irrigation of plots A and B was begun grasses and clovers soon began to form a turf and to crowd out the pennyroyal.



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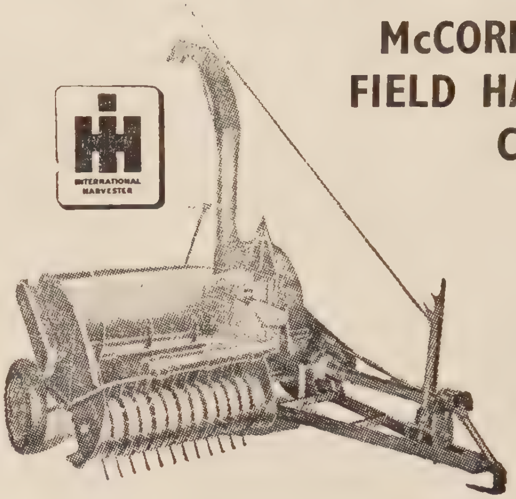

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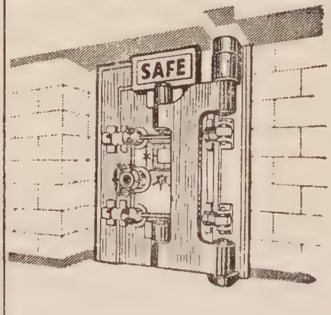

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The irrigation area at the Rukuhia Soil Research Station, Hamilton.

Plots C and F, which received 1in. waterings in the first two seasons, became far less weedy in 1948 than plots D and E, which received only ½in. of water at each irrigation. When the irrigation rates on plots C, D, E, and F were increased the weed content of plots D and E fell quickly. This fact leads to the conclusion that for best results ½in. waterings are not sufficient on the Hamilton clay loam. This is supported by other results set out later.

Effect on Pasture Production

Two methods were used to measure the effect of irrigation on pasture production—mowing of measured areas in each plot, and recording the number of sheep-grazing hours afforded by each plot.

Data for 1947 and 1948 will be only summarised. In 1947 the pasture, which had then been established only recently, was very poor, and in 1948 the production was almost double that of 1947.

Results for 1947

Taking the unirrigated pasture as 100, the following results were obtained in 1947:—

Treatment	Pasture production	Sheep-grazing hours
Unirrigated	100	100
15 waterings of ½in. (total 7½in.) ..	127	137
15 waterings of 1in. (total 15in.) ..	137	149

Fifteen applications each of ½in. of water increased pasture production by 27 per cent. and sheep carried by 37 per cent.

Fifteen applications each of 1in. of water increased pasture production by 37 per cent. and sheep carried by 49 per cent.

Results for 1948

Rates of irrigation were changed during 1948. Plots A and B continued to receive no irrigation until December 21, and up to that date plots C and F received waterings at the rate of 1in. per acre as in the previous year. However, from February 18 the waterings on plots D and E were increased from ½in. to 1in. per acre, as from the first year's trial it appeared that ½in. waterings were far inferior to those of 1in.

It was decided to irrigate plots A and B from December 21, as weed infestation had made them useless as controls, and from that date they received waterings at the 1in. rate. Plots D and E continued to receive waterings of 1½in. per acre, and the rate of watering on plots C and F was increased from 1in. to 2in. at each irrigation. The December irrigation could barely have affected the results, so it has been omitted from the following table, which summarises the year's treatment, all the irrigations being applied in January and February:—

Plots	Number of irrigations	Rate per acre	Total applied per acre
A and B ..	0	—	—
C and F ..	7	1in.	7in.
D and E ..	5 2	½in. 1½in.	5½in.

Taking the average of the unirrigated plots A and B as 100, the following table summarises the results:—

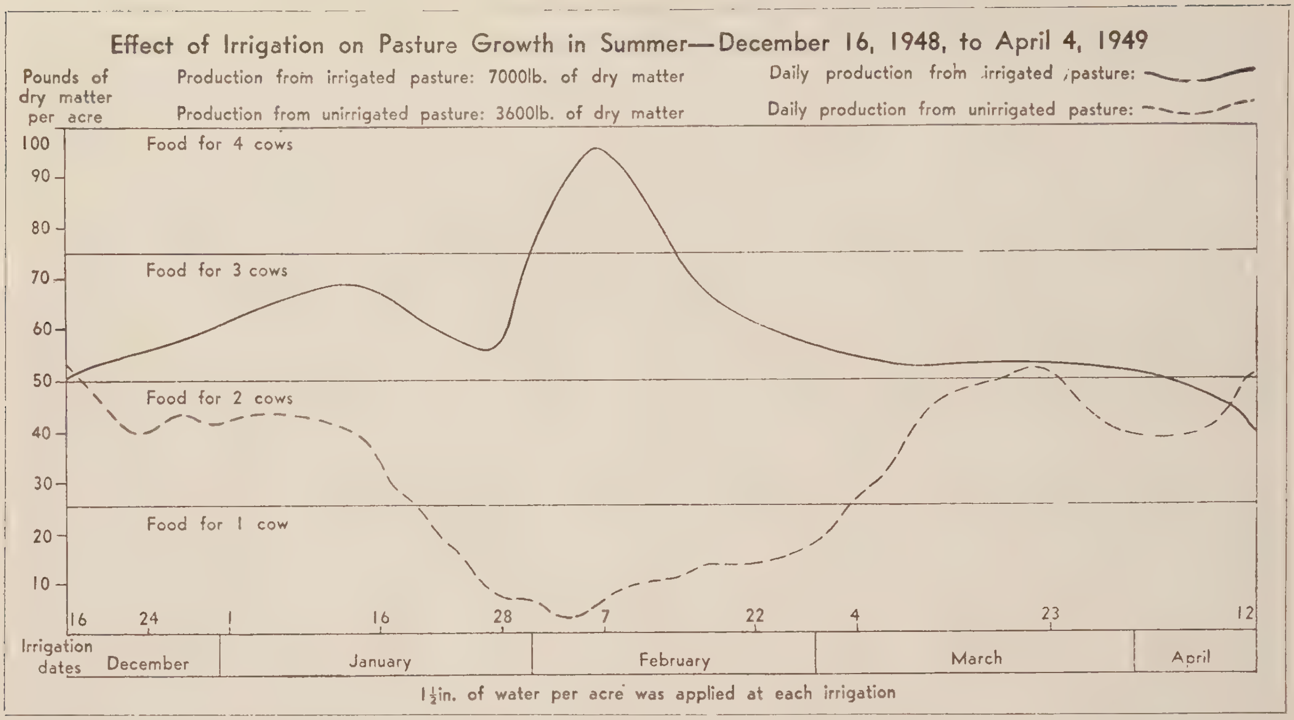
Treatment	Pasture production	Sheep-grazing hours
Unirrigated	100	100
5 waterings of ½in. plus 2 of 1½in. (total 5½in.) ..	120	145
7 waterings of 1in. (total 7in.) ..	125	155

The addition of 5½in. of water increased pasture production by 20 per cent. and sheep carried by 45 per cent.

The addition of 7in. of water increased pasture production by 25 per cent. and sheep carried by 55 per cent.

Twelve Months Ended April 12, 1949

Results for the 365 days from April 13, 1948, to April 12, 1949, are given in more detail, as the pasture had then more than reached the standard of an average Waikato pasture.



Effect of Irrigation on Pasture Growth in Summer—December 16, 1948, to April 4, 1949

1½in. of water per acre was applied at each irrigation

Irrigations for the period were as follows, all being given from December 21 onward and the last at the end of March and in early April:—

Plots	Number of irrigations	Rate per acre	Total applied per acre
A and B ..	8	1in.	8in.
D and E ..	8	1½in.	12in.
C and F ..	8	2in.	16in.

Data for pasture production and sheep-grazing hours are as follows, figures for the unirrigated pasture being obtained from a neighbouring area of similar land:—

	Unirrigated	Amount at each watering* 1in.	1½in.	2in.
Pasture production (lb. of dry matter per acre)	12,363	11,982	14,908	14,778
Sheep-grazing hours per acre ..	Not recorded	39,824	52,673	48,450

* Average of two plots in each case.

The plots receiving 1in. waterings produced slightly less than did the unirrigated pasture, but the pastures in these plots had deteriorated badly before irrigation and had become heavily weed infested. One of the plots receiving 1½in. waterings produced 15,380lb. of dry matter per acre in the year.

Taking the figures on the unirrigated area in the preceding table as 100, the following pasture-production figures are obtained:—

Unirrigated	100
1½in. waterings	120.6
2in. waterings	119.6

The 1½in. and 2in. waterings appear to result in 20 per cent. more production for the 365 days than from the unirrigated area, and it would seem that more than 1½in. at each watering is not needed.

Plots A and B have been excluded from this comparison.

No data are available for sheep-grazing hours on the unirrigated pasture, but the figures showed that pasture production was about equal to that on plots receiving 1in. waterings. Assuming that the sheep-grazing hours would also have been the same and taking the 1in. waterings as 100, the following figures are obtained:—

1in. watering	100
1½in. watering	132
2in. watering	122

Therefore, in a season in which the summer rainfall was more favourable than usual 1½in. waterings increased the number of sheep carried by 32 per cent. Increasing the rate of watering to 2in. appears to have reduced the carrying capacity slightly.

However, figures for the year's production do not show up the true value of irrigation, which is outstanding during the summer drought period. From the middle of February, 1948, until the third week in March there was no measurable growth on the unirrigated area, whereas at that time the irrigated plots were producing enough to feed 2 milking cows fully per acre. In February, 1949, the unirrigated area was giving very little growth, whereas the irrigated plots were producing sufficient to carry 4 milking cows per acre.

Cost of Spray-irrigation Plant

The cost of a suitable spray-irrigation plant for a farm can only be estimated roughly. If a farmer desires a detailed estimate he can obtain it from firms who undertake this work.

It would seem that if 10 per cent. of the area of a dairy farm were under irrigation, a farmer would be able to maintain his production in an ordinary drought year. Spray line for a 15-acre area would cost about £450 and a suitable electric motor and centrifugal pump about another £100. Where water is available from a river or stream, this would be the total cost.

On almost all the light sandy loams in the Waikato ample water for irrigation is available about 20ft. below the surface. Wells sunk to this depth and lined with concrete rings can provide 1000 to 2000 gallons per hour, according to size. Several such wells can be sunk close together and the same suction pipe can be used to draw from them all at the same time. Such a well 3ft. 6in. in diameter and providing 1000 gallons per hour costs about £30.

To irrigate 1 acre 1in. deep requires 23,000 gallons of water, so with a supply of 5500 gallons per hour about 4 hours would be needed to irrigate 1 acre with 1in. of water.

In a bad drought year a dairy farmer may suffer a loss in production of £500 on a 100-acre farm and indirectly, because of loss of condition of animals, he may lose much more.

A movable-pipe system of spray irrigation installed last year on the horticultural area at Massey Agricultural College can easily deal with 7 acres. Water is drawn from a reservoir and a tractor is used for pumping. The piping and pump alone cost less than £400.

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Wool in World Trade: An International Commodity

By R. G. LUND, New Zealand Member and Chairman, International Wool Secretariat.

SOME wool is produced in nearly every country of the world, but the countries where the most wool is produced have so far not been sufficently industrialised to consume more than a fraction of their product. On the one hand the combined consumption of wool of the four largest wool-producing and exporting countries (Australia, Argentina, New Zealand, and South Africa) is only about one-ninth of their combined production. On the other hand the four largest consuming countries (U.S.A., United Kingdom, France, and Italy) together consume six times as much wool as they produce and this in spite of the fact that the U.S.A., in addition to being one of the largest consumers, is the fifth largest producer in the world. With the exception of the U.S.S.R., all of the world's ten most important wool-consuming countries use imported wool for from 70 to 90 per cent. of their normal requirements.

THESE economic facts are the basis of wool's importance as an international commodity. In this article it is proposed to survey the position of wool in the world under five headings:—

1. Importance in World Trade.
2. Special Importance as a Dollar Earner.
3. Importance to the Producer.
4. Importance to the Consumer.
5. Current Demand and Supply.

1. Wool's Importance in World Trade

In 1938 the value of world wool exports ranked fourth in the list of world export values of raw materials entering international trade. It surpassed the value of world exports of all main categories of foodstuffs with the sole exception of wheat. No comparable figures are available for the post-war period, but in 1948 world trade in raw wool was about 2,500,000,000lb., or 350,000,000lb. greater than the average of the 5 pre-war years. Those post-war figures are slightly abnormal, for in 1948 supplies from the accumulated wartime stocks, as well as current clips, were still moving into world trade. It is unlikely, however, that the total volume of normal world trade in raw wool will decline below pre-war levels, though in future it will be limited to the current clips, which will, from next season, represent the total supply available.

2. Wool's Special Importance as a Dollar Earner

Wool has special importance in a world short of dollars. as some 70 per cent. of world exports of wool come from the sterling area. The present supply position in the United States is of particular significance. In the 5 immediate pre-war years United States wool consumption averaged 377,000,000lb. (clean) and the percentage of imported wool used varied from 9 per cent. to 34 per cent. Foreign wool, in fact, was never more than one-third of the total United States consumption. In 1946, however, which was a record year for wool consumption in United States mills, the total amounted to 748,000,000lb. of wool, of which

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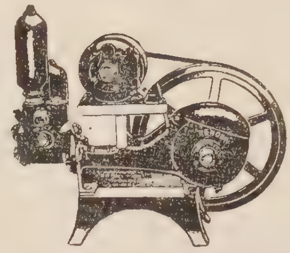
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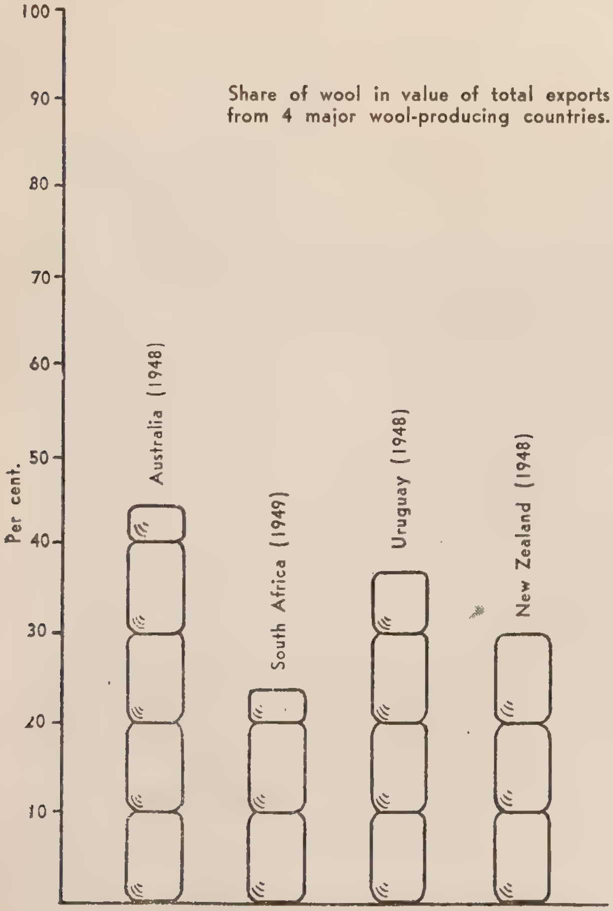
76 per cent. was imported. Domestic wool production, which was about 450,000,000lb. before the war, has decreased rapidly since 1942 and last year fell as low as 280,000,000lb., the smallest figure for nearly 70 years. Mill consumption, on the other hand, though not maintained at the 1946 level, is still above the pre-war figure, with an estimated total of 500,000,000lb. for last year. It is calculated now that roughly two-thirds of United States consumption is satisfied by imported wool.

In 1938 Commonwealth wool made up 43 per cent. of the total import of raw wool to the United States, which was 70,000,000lb. (clean content). During 1946-48 the aggregate quantity imported was 1,518,000,000lb., of which an average of 47 per cent. came from the sterling area. It is evident that United States purchases of Commonwealth wool make a vital contribution to the sterling area's dollar pool and any fluctuations in the level of consumption in such an important market are bound to have a marked effect on the sterling-area economy. Among dollar-earning commodities exported from the sterling area wool ranks very high, being in 1947 second only to rubber.

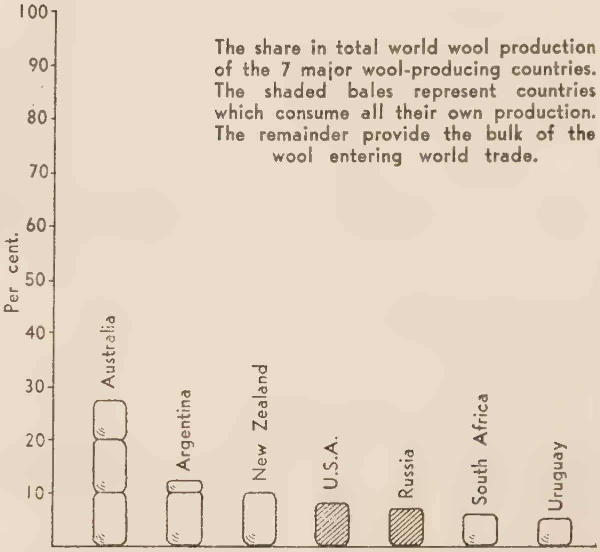
Even this is not the full measure of wool's economic importance to the sterling area. To the dollar earnings of direct raw-wool exports must be added the earnings of Commonwealth exports of wool manufactures to the U.S.A. and Canada. These exports, being made from wool bought in sterling, also represent a net gain of dollars to the sterling area. Just under 90 per cent. of U.S. and Canadian imports of wool manufactures come from the sterling area. By far the largest contributor, of course, is the United Kingdom. In 1949 the value of United Kingdom wool-textile exports represented about 6 per cent. of all exports. The total value of wool-textile exports was £104,000,000, of which goods to the value of £20,000,000 earned dollars in the United States and Canada.

3. Wool's Importance to the Producer

Three countries, Australia, New Zealand, and Argentina, produce half of the world's wool. Seven countries produce three-quarters of it. These are, in order of quantity produced, Australia (27 per cent. of world total), Argentina (12 per cent.), New Zealand (10 per cent.), U.S.A. (8 per cent.), Russia (7 per cent.), South Africa (6 per cent.), and Uruguay (5 per cent.). Two of these countries, U.S.A. and Russia, consume all their own wool, and therefore the five remaining Southern Hemisphere countries—the three British Dominions and Argentina and Uruguay—provide by far the bulk of the wool entering into world trade.



Share of wool in value of total exports from 4 major wool-producing countries.



The share in total world wool production of the 7 major wool-producing countries. The shaded bales represent countries which consume all their own production. The remainder provide the bulk of the wool entering world trade.

To these five countries wool is important. To four of them, excluding Argentina, which has other even more significant export commodities, wool is of very special, indeed vital, importance in their economic life. In Australia, South Africa, New Zealand, and Uruguay wool is (with the exception of bullion and specie) the export commodity most lucrative to peoples whose economies are based on exporting food and raw materials. A few figures illustrate this point. In 1948 wool represented 44 per cent. of the total value of exports from Australia, 23 per cent. of total exports from South Africa (1949), 37 per cent. of total exports from Uruguay, and 30 per cent. of total exports from New Zealand. In the case of Australia wool is far and away the most valuable single export. For the last 50 years exports of wool and semi-manufactured wool products from Australia have never fallen in value below 30 per cent. of exports of total merchandise and in several years they have been higher than 50 per cent.

4. Wool's Importance to the Consumer

Last, but greatest of all, is wool's importance, chiefly as a clothing fibre, to millions of consumers throughout the world. World wool production, of which about four-fifths is apparel wool and one-fifth carpet wool, is estimated in the current season (July, 1949-June, 1950) at 3,780,000,000lb. (greasy basis). This is very little more than 1½lb. per head of the world's population of roughly 2,400,000,000. Considering that an advanced country like the United Kingdom has an annual consumption of about 6¾lb. of wool per head, it can be realised how inadequate is the total world supply in relation to the amount required for even the minimum standard of wool clothing. This is true even if allowance is made for the smaller need for wool in tropical climates.

Wool consumption per head is closely correlated with national income per head and standards of living. The United States and Western Europe together consume by far the bulk of the world's wool. In fact the amount of wool people use is, as a rule, a good index to their prosperity.

As with all good rules there are exceptions. Before the war Americans, with probably the highest standard of living, used, on the average, less wool than many poorer nations. Their annual per capita consumption was under 3lb. There are a number of special reasons for this, of which the widespread use of central heating and, in the

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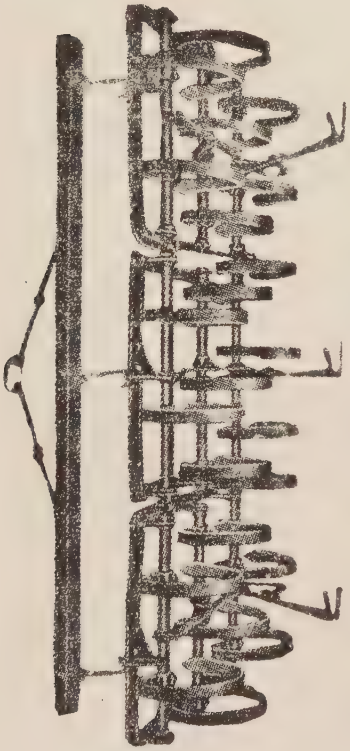

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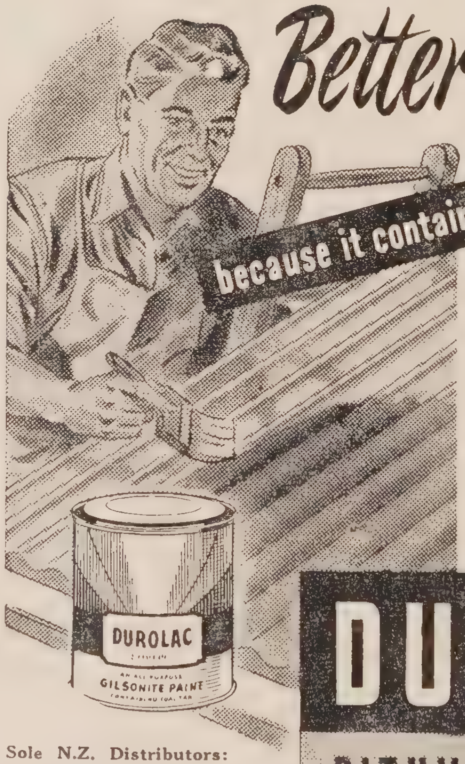

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view of some, the effect of high import tariffs are the most important. Immediately after the war the position was radically changed. In 1946 Americans consumed 5lb. of wool per head—nearly twice as much as before the war. This was understandable in view of the backlog of demand which existed at the close of the war. The surprising thing was that consumption stayed at the wartime level during 1947 and 1948, the per capita consumption being just 4¾lb. Last year, however, consumption was 29 per cent. below the 1948 level. This, combined with a 3,000,000 increase in population, brings the per capita figure down to just over 3½lb., which, though higher than before the war, is still much below the consumption levels of many countries with lower standards of living. By 1948 the backlog of domestic demand must have been satisfied, but the chief contributory factor to the reduced consumption level in 1949 was, undoubtedly, the business recession which set in at the end of 1948 and continued until the early summer of 1949. The rate of consumption during the last half of 1949, however, shows that in the absence of such fluctuations in demand United States per capita mill consumption of wool should rule above the pre-war level by a considerable margin. The increased real income of the average consumer, compulsory wool-labelling legislation, and wool publicity and promotion are all playing their part in maintaining this improved level of consumption.

5. Current Demand and Supply

As has been shown, the supply of wool, like that of most valuable commodities, is much too small to provide the whole world with clothing standards approaching those in Britain. This is a result of hard economic facts, however much it may be deplored on social grounds. In practice, therefore, we have in the short run to consider the world's wool resources in relation not to physical needs but to effective demand expressed in purchasing power. Broadly speaking, over the long period, the interactions of supply, demand, and price result in a rough kind of equilibrium. In other words, apart from major wars and other upheavals, all the wool produced is usually quickly consumed. The Second World War, however, like the first, gave rise to certain special difficulties and upset the equilibrium. As a result, stocks accumulated both in Britain and the Dominions and in U.S.A., and by 1945 these stocks were equal to about 2 years' supply. Stocks of Dominion wool—all apparel wool—amounted to 10,500,000 bales, which it was estimated would take 13 years to dispose of.

In the event the experts were most happily confounded. The post-war world was hungry for wool and consumption surpassed all expectations. Broadly speaking, world consumption of apparel wool since the war has exceeded production by an average figure of about 20 per cent. Thus the accumulated stocks, far from being a drag on the market, have served to meet the needs of a wool-starved world. As a result of this high level of consumption, the Dominion wool stock-pile was reduced from 10,500,000 bales in 1945 to just over 1,000,000 bales in December last year, and is expected to be virtually liquidated by the end of the present season.

The International Wool Study Group has estimated a world apparel-wool production figure for 1949-50 of 3,015,000,000lb., a 2 per cent. increase on the previous season, but still only just over the pre-war average. Their estimate of total apparel-wool consumption, however, is 3,528,000,000lb. This indicates that during the current season consumption is running at 17 per cent. above production; by the end of the season there will be virtually no stocks of wool except those normally held by the trade in the consuming countries.

The chief task confronting producers appears to be the restoration of flocks in the main wool-producing areas. Australian sheep numbers are improving and are currently estimated at 115,000,000, but this figure still does not touch the peak number of 125,000,000 reached in 1942. South African woolled sheep numbers have decreased by 21 per cent. since 1938. A serious drought this season has depleted South African numbers still further: The wool clip is estimated to be 4 per cent. lower than that of last season. Not much change is expected in New Zealand and Uruguay, though a slight increase is expected in Argentina. As already noted, the United States clip is one of the lowest on record.

Apart from the problem of finding adequate labour, attention is being focused on the carrying capacity of the land. Growers in the Dominions and the United States are being urged to increase their flocks and wool production. In Australia, South Africa, and New Zealand great emphasis is being placed on biological research, sheep diseases are being combated, breeds are being improved, the yield of wool is being made heavier and of finer quality, and the problems of soil erosion and soil fertilisation are being resolutely faced. Results, of course, cannot be expected at once and meanwhile wool of the finer grades particularly will continue to be in short supply.

[*Lovell-Smith Studio photo.*

The wool industry in New Zealand has steadily evolved and expanded from the earliest days of settlement, and today wool is one of the major items of export.

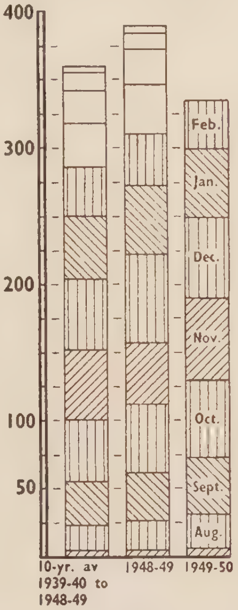
PRIMARY PRODUCTION MONTHLY REVIEW

From data supplied by the Statistical Section, Extension Division, Department of Agriculture, Wellington

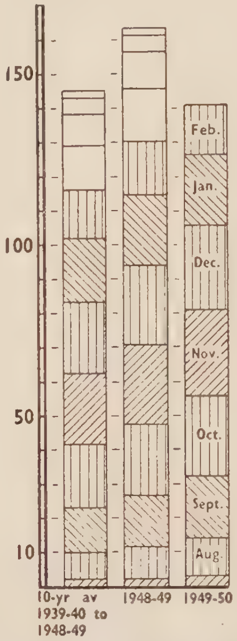
DAIRY PRODUCE (FACTORY PRODUCTION ONLY)

Season July 1 to June 30: Order of months July to June reading upward in each column

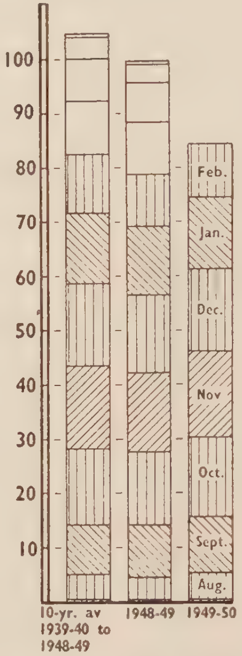
BUTTERFAT USED FOR BUTTER AND CHEESE
Millions of pounds



CREAMERY BUTTER
Thousands of tons



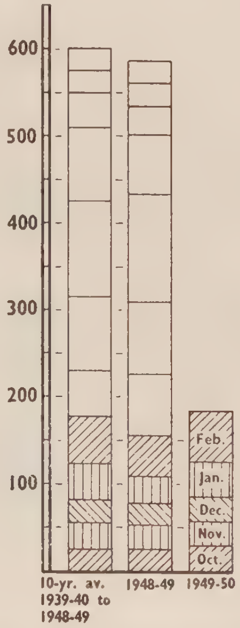
CHEESE
Thousands of tons



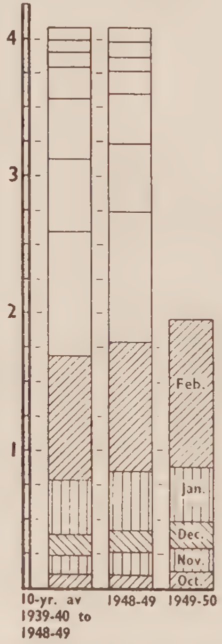
LIVESTOCK SLAUGHTERED AT MEAT EXPORT WORKS AND ABATTOIRS

Season Oct. 1 to Sept. 30: Order of months October to September reading upward in each column

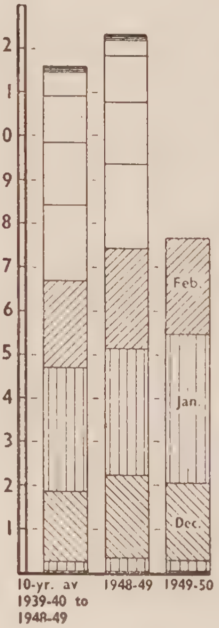
CATTLE
Thousands of carcasses



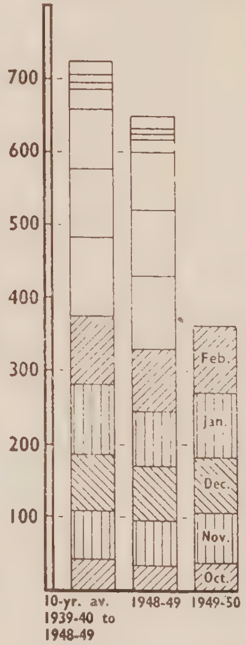
SHEEP
Millions of carcasses



LAMBS
Millions of carcasses



PIGS
Thousands of carcasses



Housing Requirements of Adult Poultry

POULTRY-HOUSING requirements may be stated precisely, yet they cannot be fitted into one design which is satisfactory in all circumstances or which suits all types of climate in New Zealand. Therefore this article by S. G. Haddon, Poultry Instructor, Department of Agriculture, Auckland, concentrates on enumerating the requirements of adult birds and illustrates some of the ways in which these requirements may be met.

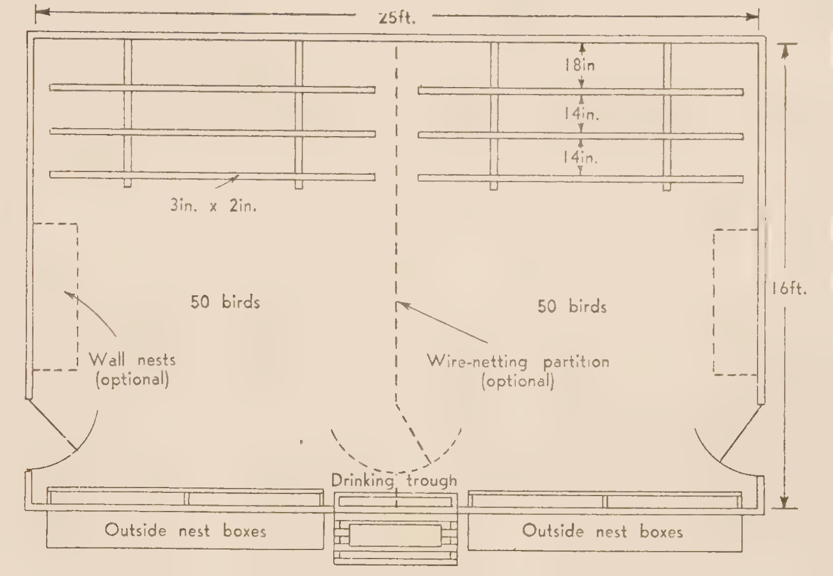
THREE factors influence the area considered necessary for a poultry farm—the size of holding and the area of housing required for the number of birds to be kept and the area of runs required to prevent early fouling.

An area of 6 to 8 acres is now generally regarded as the minimum for a one-man unit of about 1000 adult birds. A farm of this size permits large runs for the breeding stock, ample room for the chicks in the brooder stage, and what amounts to free range for the growing stock. The laying birds may have to be kept intensively or given limited runs for only part of the year. On some farms up to 2000 adult birds are kept on 5 acres or less, but most of the owners admit that they are hard pressed for rearing ground and space for greenfeed cultivation.

The Minimum per Bird

If runs and range are not to need frequent and prolonged resting, a minimum of 19 sq. yds. per adult bird must be allowed—that is, a flock of 100 birds (a convenient size with which to work) requires a run at least 180ft. by 90ft. or other dimensions giving the same area. If the area is smaller, the runs will rapidly become worn and "fowl sick," requiring work and expense to make them sweet and safe again.

This minimum area need not necessarily be in one run. Two or more runs which can be used in rotation are advisable and often allow a better layout, particularly if the birds are restricted to less than 19 sq. yds. each.



Plan of a 100-bird poultry house.

Design of Housing

Floor areas of houses may be calculated on the basis of at least 4 sq. ft. per bird for 50 birds or more and 5 sq. ft. per bird for fewer than 50. These areas are independent of any outside runs, as the danger of overcrowding is greatest at night, when all the birds are in their house, not during the day, when the flock may be wandering over free range.

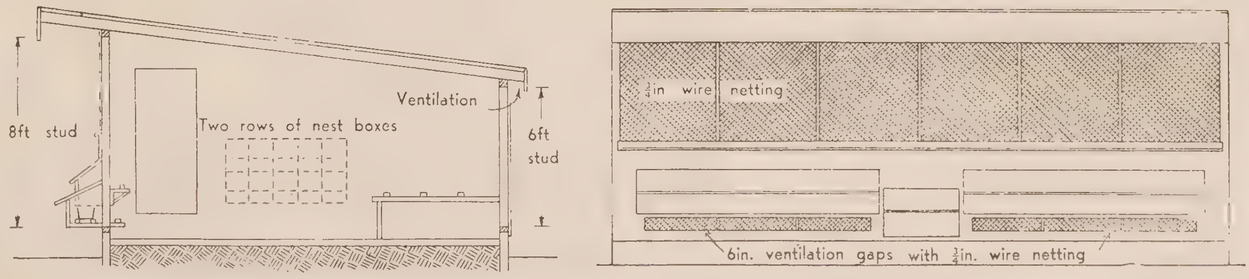
A convenient size of house for 100 birds is 16ft. deep by 25ft. long, illustrated on this page. It is long enough to be divided into two 50-bird pens by a wire-netting partition, deep enough to ensure reasonable freedom from draughts from the open front, and does not present structural difficulties. It is only one of many types capable of housing 100 adult birds, but it has the following essential features: Adequate floor space, nest boxes, drinking facilities, and perch room; a concrete floor raised on hard fill above the level of the surrounding ground; a roof overhang providing protection from weather without shutting out light and air; a baffled ventilation opening along the rear top wall plate; and adequate head room for the attendant.

Another ventilation opening along the bottom of the front wall, protected by the overhang of the external nest boxes, may be invaluable if continued bad weather forces a flock owner to cover up some or all of the open front to exclude driving rain. That applies more particularly to the Auckland suburban district, where 2 or 3 consecutive days of wet north-easterly weather may be experienced.

Fittings of House

Interior nest boxes (shown in broken lines) may be installed in preference to the outside type.

Droppings boards are not shown. They went out of favour some years ago, but droppings boards or wired-in droppings pits are coming back into use again, with a consequent better control of the birds' health. Judicious use of builder's lime (hydrated lime) keeps these fittings sweet and dry between cleanings. If droppings boards are fitted, a 6in. clearance should be left between them and the undersides of the perch supports. Any joints and the grain of the timber in them should run from back to front to facilitate cleaning by scraping.



Section and front elevation of the poultry house shown in the plan above.

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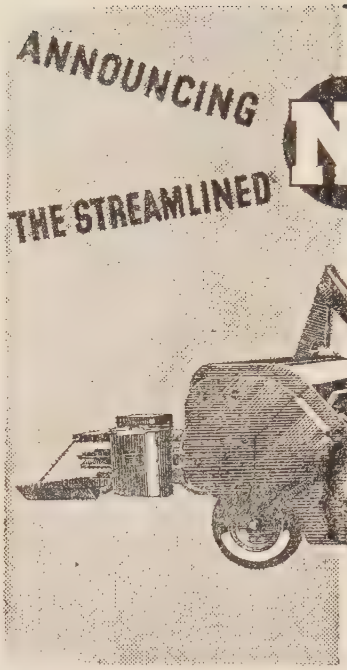

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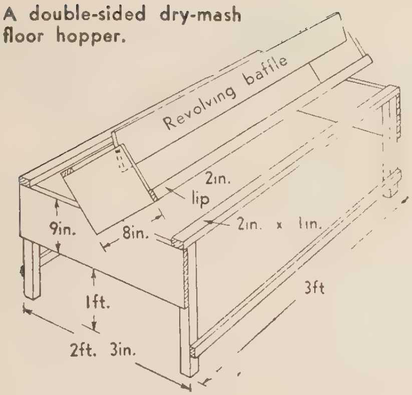
THE FITTINGS OF A POULTRY HOUSE

A double-sided dry-mash floor hopper.


Revolving baffle
2in.
lip
9in.
8in.
2in. x 1in.
1ft.
3ft
2ft. 3in.

There are many designs for nest boxes, some good, some bad, and two types are illustrated below. Interior nest boxes may have wire-netting floors or solid floors covered with deep, dry litter—for example, dry sawdust. A hinged perch along the front facilitates the birds' entry to the nests but can be folded up to prevent their roosting in the nests at night. A multiplicity of nest boxes is unnecessary. One nest 3ft. wide is as efficient as three single nests each 1ft. wide and is easier and cheaper to make. The external nest box shown is of this long, partitionless type.

Perches are best made of 3in. x 2in. timber, mounted on edge, with the two top corners bevelled. They should stop short of the walls to prevent birds huddling against a solid surface. A perch should not be fixed in position permanently but should be rested on its supports and prevented from rolling over by a nail each side driven into the support but not into the perch, which can be lifted occasionally to check that red mite is not present.

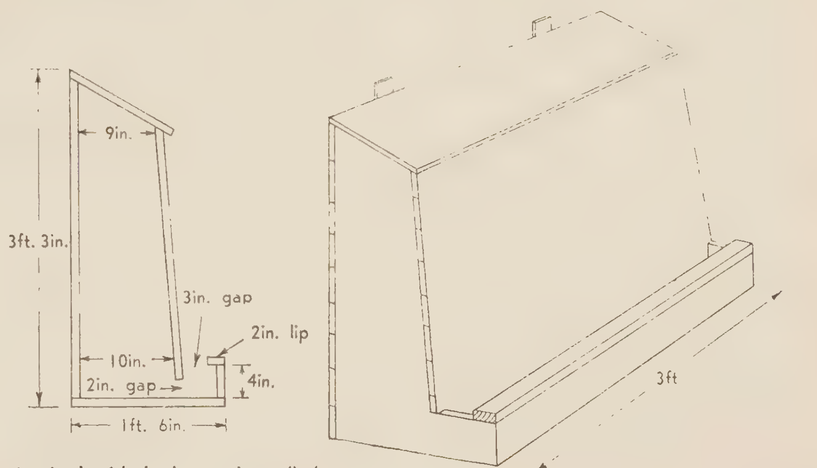
Drinking and Feeding Equipment

Too often drinking facilities in a poultry house or run are the centre of a dirty, muddy patch which makes a splendid focal point for the causative organisms of coccidiosis, coryza, and intestinal worms. If the drinking vessel is placed on a slatted platform, any water which is spilt may be collected and conducted away from the interior of the house. Such an arrangement (illustrated on the left) has the advantages of being accessible from outside the house and of lending itself to the installation of a ball-valve-controlled water supply.

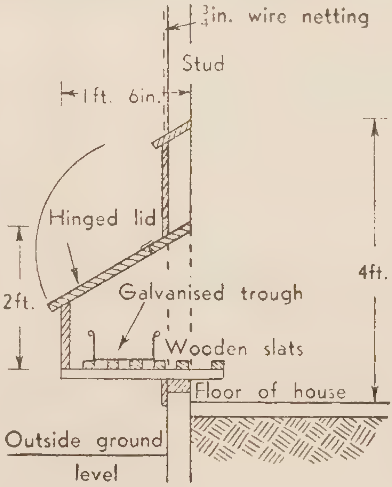
Irrespective of the system of feeding, satisfactory egg production depends on each bird receiving all the food it requires, which necessitates a sufficiency of hoppers and troughs. Dimensions of the single-sided dry-mash wall hopper illustrated above may be varied to suit the sizes of material on hand, and that applies to all the feeding appliances shown.

The double-sided dry-mash hopper for use on a stand does not rob the birds of floor space, as they can move around underneath it. It has the advantage of holding several days supply of dry mash for 100 birds, yet the attendant can see at a glance how much mash remains. It is practically non-spillable but easily refilled, which is more than can be said for many types of mash hoppers.

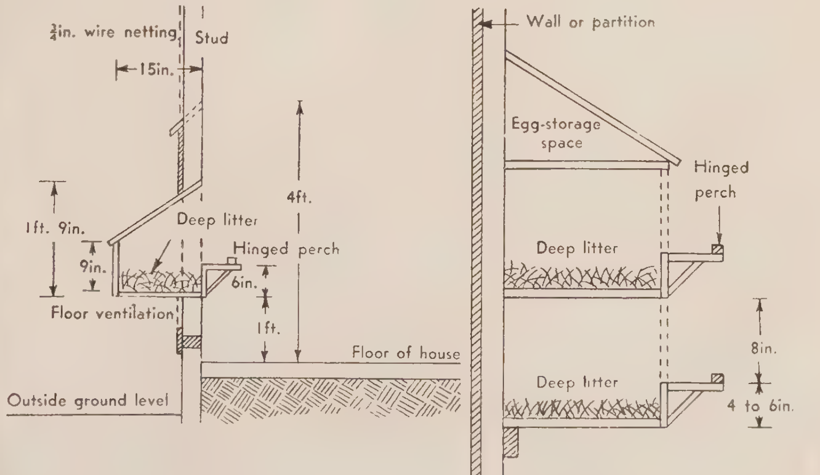
If only dry mash is used, provision should be made for at least half the flock to be feeding at once. That means that 100 birds require 24ft. of hopper space—for example, three single-sided hoppers 8ft. long or two double-sided hoppers 6ft. long. If wet mash is fed in addition, this length may be reduced, but sufficient wet-mash troughs must be provided for all the birds to feed at once; 100 birds would then require three 8ft. troughs or their equivalent of the type illustrated below.


9in.
3ft. 3in.
3in. gap
2in. lip
10in.
4in.
2in. gap
1ft. 6in.
3ft

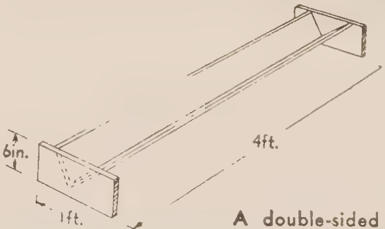
A single-sided dry-mash wall hopper.


¾in. wire netting
Stud
1ft. 6in.
Hinged lid
4ft.
2ft.
Galvanised trough
Wooden slats
Floor of house
Outside ground level

An external drinking trough which prevents spilt water from wetting the floor of the house.


¾in. wire netting
Stud
15in.
4ft.
1ft. 9in.
Deep litter
9in.
Hinged perch
6in.
Floor ventilation
1ft.
Floor of house
Outside ground level
Wall or partition
Egg-storage space
Hinged perch
Deep litter
8in.
Deep litter
4 to 6in.
15in.

Sections through exterior (left) and interior (right) nest boxes.



A double-sided wet-mash hopper.

HOUSING REQUIREMENTS FOR ADULT FOWLS

		PER 100 BIRDS
Land	19 sq. yds. per bird for free range	180ft. x 90ft.
Housing floor area	Fewer than 50 birds, 5 sq. ft. per bird More than 50 birds, 4 sq. ft. per bird	400 sq. ft. (16ft. x 25ft.)
Nest boxes	1 nest 12in. x 12in. x 15in. to each 4 or 5 birds	1 row 20ft. long, 2 rows 10ft. long, etc.
Trap nests	1 to 3 birds	33
Perches—		
Light breeds	8ft. per bird	66ft. (6 perches of 11ft., etc.)
Heavy breeds	10ft. per bird	84ft. (6 perches of 14ft., etc.)
Drinkers	3 to 4 gallons capacity daily per 100 birds	1 drinker 8in. x 4in., 2½ to 3ft. long
Dry-mash hoppers—		
Single sided		1 of 24ft., 3 of 8ft., 4 of 6ft., etc.
Double sided		1 or 12ft., 2 of 6ft., 3 of 4ft., etc.
Wet-mash troughs, double sided		1 of 24ft., 2 of 12ft., 3 of 8ft., etc.

Nearly all poultry requirements of housing and equipment can be reduced to figures. In the table above that has been done as far as is practicable, but the figures must be considered only as a guide.

With the present cost and scarcity of all building materials, use should be made of whatever is available, from hollow concrete wall blocks and pine weatherboarding to wooden floors and tarred roofing. Corrugated aluminium is used for roofing but is expensive, though apparently satisfactory.

The plans and sections of the 100-bird house do not give details of stud and rafter spacing, which are points on which any builder or carpenter can advise; in any case, the material used will determine the finer points.

Ventilation

Ventilation is an important subject which cannot be reduced to figures. It cannot be said that an opening of a certain size in a certain position will keep the air in a house as fresh as it should be. Much experimental work remains to be done, but a poultry farmer can help himself by taking one or two smoke pots into a poultry house and seeing where the smoke goes and what happens to it. Improvements in ventilation are often suggested by this method.

Ventilation should always be provided along the top plate of the rear wall under the overhanging eave. Excessive ventilation can be blocked easily, but inadequte ventilation is difficult and expensive to remedy.

☆

Trials with Shallow, Small-bore Mole Drains

By C. J. HAMBLYN, Fields Superintendent, Department of Agriculture, Palmerston North.

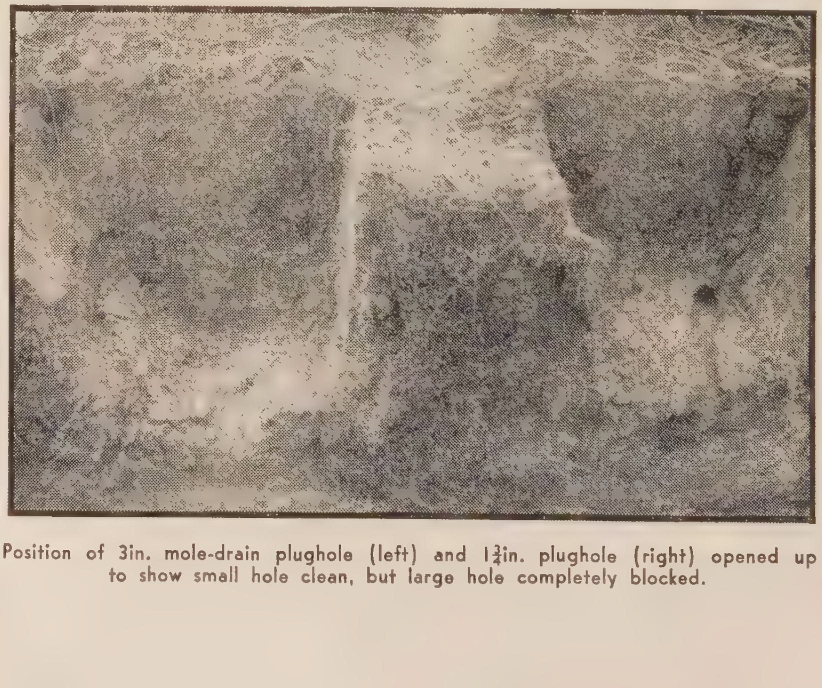
A MANAWATU farmer who had been experimenting with a light mole plough using a plug of less than 2in. diameter for mole draining his pasture land demonstrated that, under his particular conditions, the small plug drawn at a depth of 12 to 13in. by a light wheeled tractor was giving excellent results in improved drainage. It was doubted, however, whether the drains would last, and about 4 years ago a small trial was laid down in a paddock on typical Manawatu mole-drainge country (6 to 8in. of black-brown topsoil overlying a stiff, yellowish clay subsoil, under pasture, and where winter conditions were such that the pasture was pugged and cut about when stocked with cattle).

A NUMBER of standard mole drains was drawn with the 3in. plug at depths of 18 to 20in. Alongside these a similar set of mole drains was drawn with a 1¾in. plug at depths of 12 to 13in., and for a further comparison a few drains were drawn at the same depths with the 3in. plug. The shallow drains were drawn at a spacing of about 6ft. and the deeper drains were spaced about 9ft. All drains were about the same length and discharged into an open drain. They have been kept under observation where they discharge into the open drain, particularly after heavy rain, for 4 years.

Observations showed that the shallow, small-bore drains have continued to give very effective drainage to the area covered by them and quite as good as that given by the 3in. moles at the usual depth on this country. The shallow 3in. drains, however, failed to work after a very short time. A recent close inspection of these drains showed that both the deep 3in. moles and the shallow 1¾in. moles were in good order, but the shallow 3in. moles had all broken down and were completely blocked.

There was some evidence of grass roots having grown into the shallow 1¾in. moles, but this was not sufficient to block them and the roots appeared to be dead. Further observation and information are required on this aspect of their life, as they may become blocked by such roots while the deeper drains remain clear.

However, the fact that the shallow, small-bore mole drains have worked very well for 4 years and have been quite as effective as the deeper 3in. drains, coupled with the fact that the light, small-bore mole plough can be pulled with light and medium, farm wheeled tractors fitted with extension rims, offers possibilities of many more farmers doing mole draining themselves. It may be necessary where shallow, small-bore mole drains are made, to do this work more frequently than where deeper moles are put in, but the work would be very much cheaper. Minor mole drains can be joined to major outlet drains just as effectively with shallow, small-bore moles as with the usual deeper mole drains.



Position of 3in. mole-drain plughole (left) and 1¾in. plughole (right) opened up to show small hole clean, but large hole completely blocked.

An Auckland Gumland Orchard

By I. L. NOTTAGE, Orchard Instructor, Department of Agriculture, Auckland.

MANY of the orchards in the vicinity of Auckland are planted on what is known as gumland, and those who work it will agree that the land is aptly named. They could be excused for associating the term with the nature of the soil, although it is probably well known that gumland is land on which kauri trees grew many years ago and from which kauri gum was dug more recently. Perhaps the fact that the valuable kauri logs were produced at the cost of very serious soil deterioration is less well known. This article deals with the development of an orchard on gumland near Auckland.

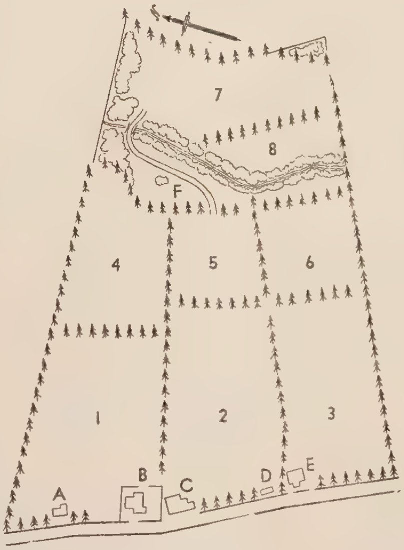
[*Natural Photographers photo.*

Looking across block 1 of the orchard; this view shows the hilly nature of the country.

GUMLAND soils vary in type from peat, on some of the flats, through light to medium clay loams, to heavy clay soils. There are patches of lighter soil somewhat similar to volcanic types, but almost invariably the subsoil is a heavy clay. Most of the gumland soils are extremely sticky, hard to work, not easy to drain satisfactorily, and yet are inclined to crack and dry out in summer after a month or so without rain. Much of the typical gumland planted in fruit trees is of a rolling or hilly nature, some of it fairly steep, usually with only 4 to 6in. of topsoil, except in the gullies.

The orchard with which this article deals is on hilly gumland in the Oratia district, near Henderson, 11½ miles from Auckland City. Essentially it is an apple orchard, with a considerable number of stone-fruit trees, chiefly interplanted between some of the apples, and a small area in citrus. The orchard is owned by Messrs. Adam and Anton Sunde, who came to New Zealand from the Dalmatian coast (Yugoslavia), where they had worked on their father's land. There was insufficient land to support all the members of a large family, and as there were no prospects of other employment offering even moderate possibilities of a secure future because of very disturbed conditions prevailing in the Balkans, Mr. Adam Sunde decided to come to New Zealand. Two of his brothers, Messrs. P. and D. Sunde, had preceded him by a few years, and had already established an orchard, then about 5 years old, in the Oratia district. Mr. Anton Sunde came to New Zealand in 1932.

After a settling-down period of 6 months, working for his brothers, Mr. Adam Sunde accompanied Mr. D. Sunde on a 2 years' bush-felling expedition in the Gisborne district to tide over the lean years while production from the orchard was low. Then the three brothers formed a partnership. In 1929, satisfied with their prospects as fruit growers, the brothers purchased a further 10 acres of partially improved scrub land, with a small cottage, on the opposite side of the road. In the same year they cleared the new block and planted 900 fruit trees—approximately 600 apples, 250 peaches, and 50 lemons (blocks 3 and 6 on the plan).



Plan of orchard, showing various blocks and buildings. 1—Apples, plums, some grapes, and peaches. 2—Apples, peaches, some pears, grapes, and lemons. 3—Apples, lemons, grapefruit, some peaches, plums, and pears. 4—Apples, some plums. 5—Apples, peaches. 6—Apples. 7—Peaches, apples, some plums. 8—Plums, peaches, apples. Parts of blocks 1, 2, 3, 4, and 7 have been interplanted, chiefly with peaches, and in places stone fruits have been used as replants for apples and lemons. A—Cottage. B—House. C—Packing shed, wine cellar, spray plant, implements. D—Shed. E—House. F—Horse paddock. The road on the frontage is Shaw Road, and P. and D. Sunde's orchard is on the opposite side of this road.

Twenty years ago, in the depression years, the first acres of what has been made one of the better orchards in the Oratia district were planted. An adjoining block, with another small cottage, was bought, cleared, and planted in 1930, bringing the newly planted area to 22 acres—all the available land after allowing for shelter belts and a few unsuitable acres used as a horse paddock. The total area is 28 acres. The second block, except for a small number of peaches and plums, was planted with apples, of which there were then about 3000 trees.

Pinus radiata shelter belts were planted around each block (see plan) in the same years as the fruit trees were put in. The now tall pines and the approximate north-east aspect of the land shelter the fruit trees very effectively from the prevailing west to south winds. They also steady and break up the force of occasional storms from east to north. Most of the shelter belts have been topped three times since they were planted, as they grew higher than was considered necessary for their purpose.

So far the pine trees around this orchard have remained healthy, but they will be watched carefully during the next 10 years, as on similar land numerous trees in shelter belts of *Pinus radiata*, especially those more than 30 years old, have died out in patches. From observations made it appears likely that the trees contribute to their own downfall by impoverish-

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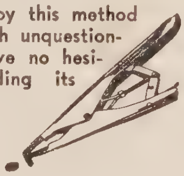

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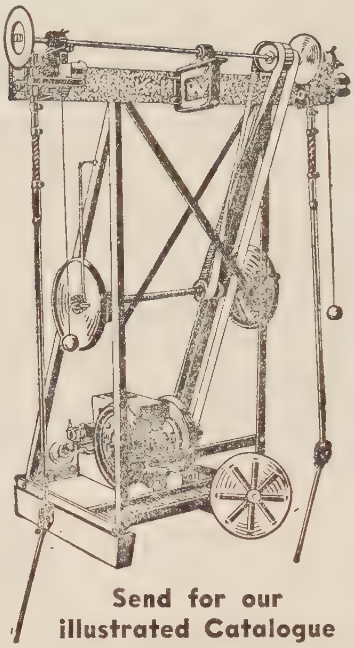

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ing the soil, thus reducing it to an extremely fine texture and still further retarding the free movement of excess water beneath the surface.

The orchard is well situated in view of the somewhat steeply rolling nature of the land in parts of Oratia district. It is on the eastern side of Shaw Road, which runs upward along a ridge in a southerly direction to join the Scenic Drive in the Waitakere Hills.

The first slope, down from the road, faces roughly north-east, and runs for about two-thirds of the length of blocks 1, 2, and 3 (see plan). There is then a rise to the top of a low ridge along which are planted the crosswise shelter belts of pines shown in the plan. Blocks 4, 5, and 6 are fairly level until they approach a second gully, rather rough and swampy and not planted. Across the gully are blocks 7 and 8, which are irregularly shaped, but are workable and have a predominantly north-west aspect. Some of the slopes are fairly steep, but in the main are not difficult to cultivate, except for a few small areas.

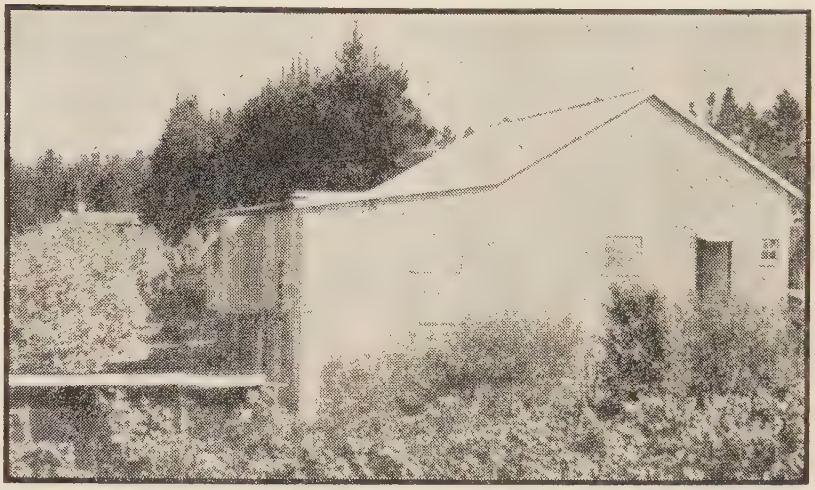
The nature of the soil varies considerably, but is mainly a fairly heavy clay type, rather shallow, with a sticky and heavy clay subsoil.

Close Planting of Trees

The fruit trees are closely planted, not more than 16ft. apart, on the square system, though blocks 7 and 8 are slightly off-square to fit in with the irregular shapes of those areas. The original object of close planting was to bring the greatest number of trees into production as quickly as possible on the available land. That objective was attained, but what of the future? On the poorer and lighter soils it is still considered that close planting was the best policy having regard to past and future economy. Where the soil is better, especially in the gullies and on lower slopes, branches meet and cross between the rows when crops are maturing. Just how the trees should be pruned to maintain production at a high level from now onward is not an easy question to answer.

Another difficult problem is the strongly developed biennial bearing habit (indicated by the production chart on page 539), which the trees have developed since they settled down to mature cropping. That problem faces most deciduous-fruit growers, but is perhaps more strongly accentuated in Auckland district. A comparatively warm winter climate fails to provide the trees with the natural chilling needed to send them into a sharply defined dormant period from which they would emerge with an even burst of spring growth. The normal balance is upset and that factor can be blamed for a major contribution toward Auckland's on-and-off cropping problem.

For some years while the new orchard was still unproductive the four Sunde brothers (Mr. Anton Sunde had by now joined his brothers) managed to survive the nation-wide depression on returns from the older block and by doing outside work. Cultivation of the younger orchard was done with horse-drawn implements and spraying with a small portable outfit which served well at that time. The work was hard, the reward small, and the prospects far from bright.



The packing shed, cellar, and spray shed.

In 1935 the orchard now well known as that of A. and A. Sunde emerged as a separate entity, these brothers taking over the 22 acres planted in 1929-30 and P. and D. Sunde retaining the older block.

The second important event in 1935 was the first crop of any consequence from the new trees. It was a small beginning—only a few hundred cases of apples and peaches—but to those who have established a new orchard a first crop has a significance far beyond its commercial value.

In 1936, by using all their available capital—a modest amount—and by obtaining a little credit, Messrs. Adam and Anton Sunde built a 36ft. x 26ft. corrugated-iron packing shed with storage loft and a smaller basement. They also piped the orchard for spraying and connected the pipes to P. and D. Sunde's stationary outfit across the road to save the cost of machinery for a time.

It was a year of hard work and a lean year, with heavy expenses to cover. Nevertheless, hopes were high, as the 1936 crop had been kept clean, and as the trees had reached the stage where they were to bear their first real crop, there was promise of an encouraging return.

Disastrous Storm

However, in February, 1936, a disastrous storm wrought havoc among the fruit trees in the district, including those in the Sunde block. Thousands of trees were blown down (many of them almost torn out of the ground), branches were broken, and roots were damaged. Crops were destroyed just a few weeks before harvest.

Shelter trees round the orchard, only 6 to 7 years old, provided little protection for the fruit trees and in fact even the pine trees suffered to some extent. Of the Sunde brothers' 3000 trees at least two-thirds were down or leaning drunkenly and the remainder were very severely battered. The crop, estimated a few days previously at 3700 cases of apples and 400 to 500 boxes of peaches, was reduced to 900 cases of apples and about 200 boxes of peaches, many of them in low grades.

Except for 200 Statesman apple trees. which suffered surprisingly little serious damage, almost every tree in the orchard required staking and tying. Many needed very careful treatment and strong bracing to prop them up. About 200 trees were beyond repair. Others, their roots seriously wrenched, failed to regain vigour and have been replaced at various times since the storm.

The prospect for 1936 was bleak. Nor could the trees be expected to make normal progress for several years. Growers who had suffered in the storm appealed to the Government for assistance, which was granted in the form of small loans. The Sunde brothers were among those who sought and received assistance, but because of the financial setback Mr. Anton Sunde worked for a year on a neighbour's orchard. Mr. Adam Sunde remained, and with part-time assistance and a horse continued to work the brothers' property; damage was repaired and trees nursed back to a condition to produce a crop in 1937. Over 2500 trees were restored to upright positions and tied firmly to stout totara stakes sunk well into the ground. Hundreds of these stakes are still in position and some of the trees depend on them for a measure of support.

Good Progress

Through the hard work done in 1936 and despite all handicaps, a crop of 3500 bushels of apples, 500 boxes of peaches, and a few lemons was harvested in 1937.

From then onward the recovery was remarkably fast. An apple crop of 5000 bushels was harvested in 1938, and that year the orchard spray pipes from P. and D. Sunde's power unit were disconnected and a separate plant installed—a 3-cylinder pump and 3 h.p. electric motor, which are still working efficiently and serving 22 acres of orchard, nearly all in full production. There are 2 double concrete spray tanks each of 500 gallons capacity. With 3 hoses working, the pump delivers 350lb. pressure (at the shed).

Grafted trees on one of the steeper slopes.

An average application of spray on the apple trees uses from 9000 to 11,000 gallons of water, drawn from town supply. For every spray application approximately a gallon of water is used for each bushel of fruit harvested in an average year, although the proportion varies slightly from year to year, according to fluctuations in crops. An average spraying of the apple trees takes 3 men 3½ days. Each orchard tap serves 81 trees, except where blocks are irregularly shaped.

A peaceful, comparatively uneventful, perhaps almost humdrum future of moderate prosperity could have been expected, but in 1939 war broke out and its immediate repercussions were felt by the fruit-growing industry. The export market for apples was lost; soon there were shortages of materials and of workers; and costs rose.

Fortunately the Sunde brothers had purchased a 28 h.p. crawler-type tractor in 1940, as later they might not have been able to obtain a machine. Equipment was further improved by acquiring sets of both tandem and off-set discs and a trailer.

Reworking Delicious Trees

At this time the orchard suffered another setback. For several years there had been difficulty in the marketing and long storage of Delicious apples grown in the Auckland district because of the incidence of brown heart or mouldy core, which was serious and appeared to be increasing in severity. This was particularly important because large quantities of Delicious apples were being exported before the war, and Auckland lines had proved unreliable.

Acting upon recommendations of the Horticulture Division, Auckland growers decided to rework thousands of Delicious trees to other varieties. In 1940 and 1941 the Sunde brothers reduced their 700 Delicious trees to about 200 by grafting them over to 200 Ballarat, 120 Granny Smith, 60 Statesman, 50 Rome Beauty, and 60 Gravenstein. These are almost the only reworked trees in the orchard. The brothers were fortunate in having comparatively few losses through die-back of the Delicious stocks, a trouble very commonly affecting grafted trees in this district. The fact that the stocks were not old, only 10 to 12 years, probably contributed to the success of the work.

Reworking of 500 trees naturally retarded the increase in crop for several years, but production reached a high level in 1944, when over 13,000 bushels were harvested.

During the war and for several years after it fertiliser supplies were inadequate, but production has been good because the trees were well treated in earlier years. The highest yield of apples, 15,400 bushels, including factory fruit, was in the 1946 season. Since then yields have been lower, though still good. As fertiliser is now more readily available, it is hoped that average production will tend to rise again.

Drainage Difficulties

In addition to the check due to reduced fertiliser application parts of the orchard have suffered to some extent from the effects of "wet feet." Though few trees have been lost, the crop-carrying capacity of some has deteriorated. Unfortunately this has been common in Auckland gumland orchards, especially in the past 3 or 4 years, and is not easy to counter. The subsoil, and very often the rather shallow topsoil, is of a sticky, fine-grained texture which does not drain readily. The trees appear able to stand fairly wet soil conditions for the normal winter period, but when similar conditions persist until late September, or even October, as in several recent years, their roots are adversely affected.

Total rainfall has not been much above average, but instead of falling in defined periods with fine spells between, allowing the soil to dry out a little and letting in air, rainfall during spring has been in the form of very frequent showers. Already-sodden soil has been kept saturated until late in spring. Low-lying flats, level hill-tops, and some of the shallow soils on fairly steep slopes have been affected. Very often the deeper soils at the bottoms of gullies drain much more freely. The provision of sufficient tile drains to be fully effective would be very expensive. Mole drains and open surface drains are helpful, but are neither permanent nor fully efficient, and the latter type are a nuisance in an orchard. Late-autumn and early-spring ploughings are very useful, but both are most difficult to carry out on sticky soils when the weather is wet, which is very often the case at these times. Satisfactory soil drainage is most difficult to achieve by gumland fruit growers.

The orchard suffered a further but relatively minor setback in 1941, when an application of faulty spraying oil caused the loss of between 200 and 300 bushels of lemons and grapefruit. The trees also were injured to the extent of being rather seriously defoliated. The citrus block was heavily infested with scales in summer several years later when the season was very dry and hot, and growers delayed spraying because of risk of injury to foliage. Later in the season the weather became suddenly wet and no spray was applied. The build-up of scales was only temporary but was serious in that season.

From 1944, when the average apple crop first exceeded 4 bushels per tree, progress has been comparatively uneventful. By that time the property was a fully equipped, self-contained unit. The packing shed had been extended to make room for a 3-section spiral-screw type of fruit grader. The basement, used as a cellar for making and storing wine, had been enlarged and improved. Lean-to sheds for the stationary spray plant and implements had been added.

Most of the building has been done by the two brothers, with some technical assistance. In 1948 a cottage was built to accommodate a permanent worker and his family.

Interplanting of Apple Blocks

One feature of the orchard, interplanting apple blocks with peach trees, is a common practice in Auckland, though seldom seen in most other districts.

At the Shaw Road end of block 3 were the first peaches and 50 lemon trees. About 1936 the peaches were pulled out because the variety, Triumph, did not crop well and was very subject to brown rot. The peaches were replaced with lemons, between which other varieties of peaches were planted. As the lemon trees now require more space, peaches are gradually being removed and will not be replaced. The apples in block 4 are interplanted with peaches and New Zealand grapefruit. The ultimate plan is to change the block over to New Zealand grapefruit and so reduce the amount of summer work in the orchard, as grapefruit are picked in winter and spring.

Other interplants are chiefly peaches, which are of various ages, some comparatively young and some almost due to be pulled out.

Advantages and Disadvantages

There is strong difference of opinion on the subject of interplanting. The practice started in the early days of the apple orchards, when peaches were used between the trees to provide an early return from new blocks. The intention was to remove the peaches in 8 or 9 years, but that was not always done.

While interplanting creates cultivation and disease-control problems, and eventually results in overcrowding, usually to the detriment of the apple trees, peaches have saved fruit growers at times when apple prices have been low.

In theory it should be better to grow the peaches in separate blocks, but very often there is no extra land available and growers prefer interplanting to pulling out their apples to make room for peaches. It is not easy to be dogmatic and it is difficult to convince a grower who is getting good peach prices that he should remove the trees for the ultimate benefit of his apples. On the other hand, when peach crops fail for any reason, and that is not uncommon, apples usually can be relied on to produce at least a moderate crop.

Though opinions as to the wisdom of interplanting may vary, the Sunde brothers are continuing to interplant.

KINDS AND NUMBERS OF FRUIT TREES

Kinds of trees	Trees planted in permanent positions	Interplanted between permanent trees
Apples	2,938	—
Pears	8	—
Peaches	301	700 (approx.)
Plums	116	30 ,,
Lemons	236	—
New Zealand grapefruit	27	100 ,,
Sweet oranges	12	—
Grapevines	75	120 ,,
Total	3,713	950 (approx.)
Total number of trees and vines		4,663 (approx.)

VARIETIES OF APPLES AND PRODUCTION NOTES

Varieties	Numbers of trees
*Ballarat	655
*Granny Smith	613
†Dunns	450
*Rome Beauty	302
*Statesman	234
*Delicious	228
Kidds Orange Red	116
†‡Mobbs Royal	107
†Cox's Orange Pippin	71
Giant Jenlton	47
*Gravenstein	35
†‡Ecklingville Seedling	24
Golden Delicious	22
†Brighton	21
†‡Warner's King	13
Total	2,938

	Bushels
Average crop, 1940-49 inclusive	9,800
Average crop per tree, 1940-49	3.4
Highest average crop per tree 1946	5.2

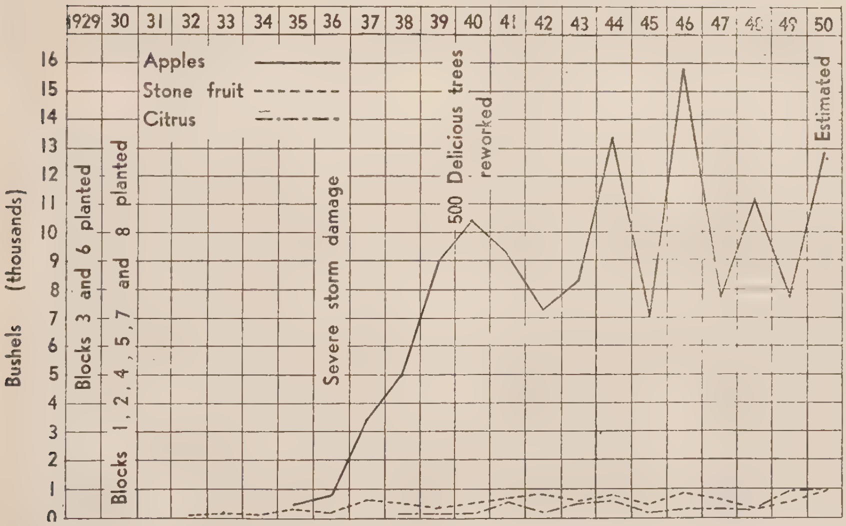
* Varieties popular in Auckland orchards.

† Varieties not grown by the majority of Auckland orchardists.

‡ Varieties usually grown only in small numbers.

NOTE: Delicious is not now recommended because in some years it is subject to mouldy core.

ORCHARD PRODUCTION CHART, 1929-50



The graph indicates clearly the relative importance of apples in the orchard. The first drop in production after 1940 was due to reworking 500 bearing Delicious trees. The extremely high 1946 crop probably reduced the crop in the 1948 "on" season. Alternate bearing has become firmly established.

However, except in block 4, which is being changed over to New Zealand grapefruit, the number of interplanted trees is being reduced steadily because in most parts of the orchard the apple trees have grown too big to allow room for peaches between the rows.

Wine-making on Small Scale

There are about 75 13-year-old grapevines growing on the property and in 1940 a further 120 were planted between peach trees on a low clayey spur in the middle of block 2. The grapes are grown for making into wine, about 500 gallons of which are made each year, some grapes being bought from other producers when necessary. Wine-making in a small way is a sideline many gumland fruit growers have found profitable.

Since the trees began bearing heavily generous applications of fertilisers have been used when the materials have been available. An average of 20 tons, plus extra poultry manure for the citrus trees, has gone on to the land in each of the past few years. Blood and bone, superphosphate, bonedust, sulphate of ammonia, and sulphate of potash have been used in various proportions. Last season the mixture used was 35 per cent. of superphosphate, 35 per cent. of bonedust, 10 per cent. of dried blood, 10 per cent. of sulphate of ammonia, and 10 per cent. of muriate of potash, and in addition 2 tons of sulphate of ammonia was applied.

Blue lupin cover crops were sown in the earlier years, but are difficult to establish now that the trees are so much larger. Heavy weed growth is a partial substitute.

Cultivation

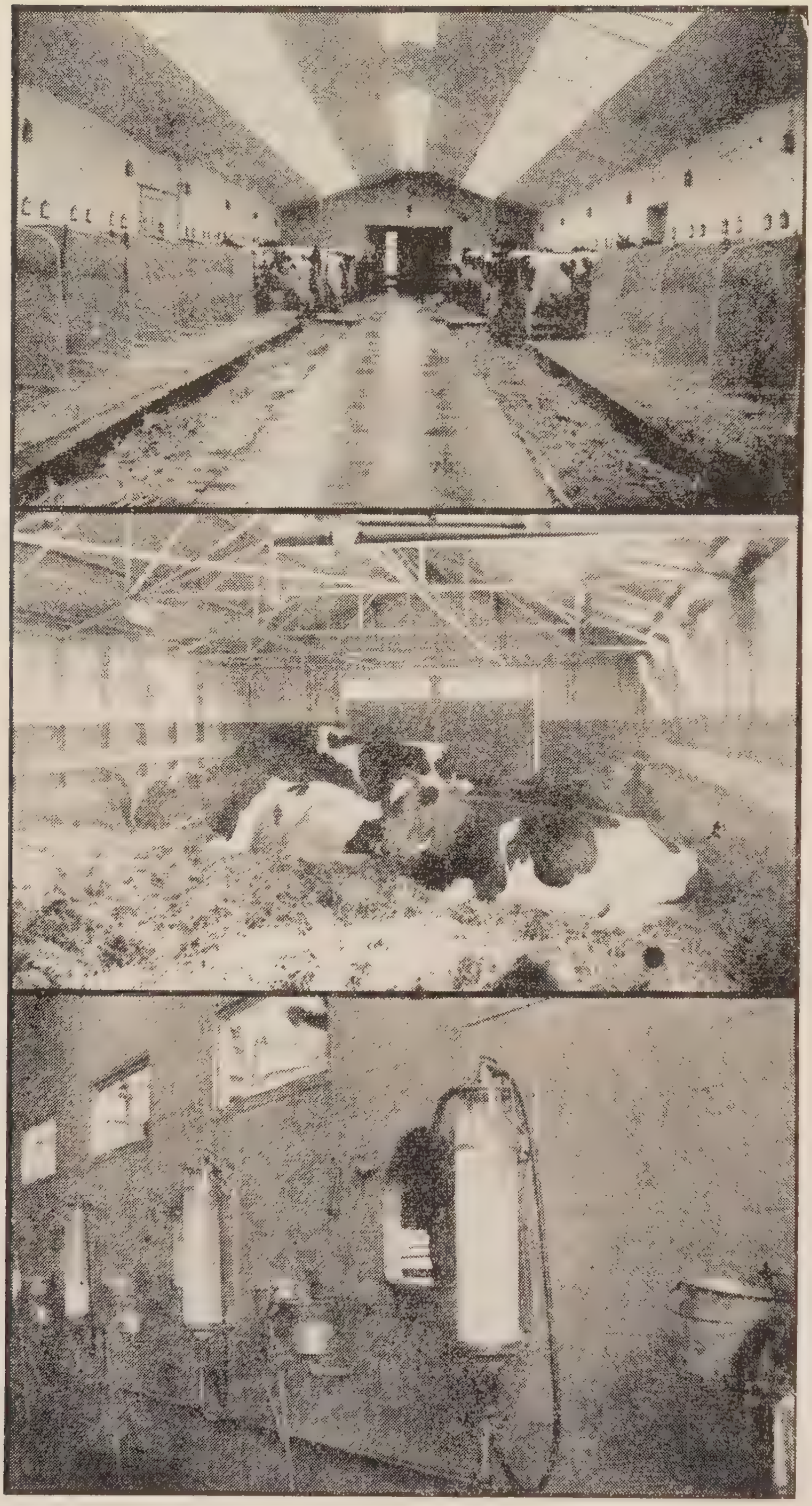
Most of the cultivation is done with discs, but one ploughing in spring has been the practice. It has been found that the soil dries up much more quickly after a spring ploughing than if the first cultivation is with discs. That is important on land where spring drainage is difficult and the soil is inclined to remain wet and cold until too late in the season.

The general standard of tree vigour is good, although there are the usual variations, according to variety or situation. Production is definitely above the average for the district.

The staff comprises the partners and one or two full-time employees, according to requirements each year, and casual hands are engaged to pick and pack the fruit. The owners' wives help with picking and packing and with picking up prunings. All fruit, except lemons, which are supplied ungraded to the Auckland depot of the Marketing Department, is graded, packed, and prepared for market on the orchard; Auckland district has no co-operative grading and packing sheds.

The Sunde brothers have established an orchard on the difficult gumland of Auckland and they have made it pay in spite of trials and adversities. The work is hard and there are many disappointments, but fruit growers with the necessary courage and tenacity can wrest a living from Auckland's gumlands.

Overseas Work on the Problems of Milking



Top—A modern stanchion barn. Middle—Cows in an American loafing barn. Bottom—A modern American milking parlour. The cows are on the other side of the wall on a platform 30in. above the milker's floor.

Observations on animal research generally and dairy cow research in particular in North America, Great Britain, and the Continent are contained in this report by W. G. Whittleston, Physical Chemist, Department of Agriculture Animal Research Station, Ruakura. The author, whose articles in the "Journal" on milk ejection of the cow and milking research generally have created wide interest among research workers and dairy farmers, has just completed a tour during which he studied progress in other countries with the work in which he has specialised for some time at Ruakura. Some of "the welter of ideas" with which the author returned are referred to only briefly in this article, but the interesting possibilities for further research are obvious, and when ideas have been tested in New Zealand there should be material for further articles of value to dairy farmers.

ALTHOUGH my interests are primarily centred in the problems related to the process of "milk ejection" in the cow, my trip abroad brought me in contact with a very varied range of information of value to our research station. In an article such as this, however, it is impossible to discuss the fascinating ideas gained in the field of new scientific instruments, the work on animal psychology I saw going on at Cornell University, or the work on radio-active isotopes under way at the University of Chicago. I would like also to discuss the role of the university in the American community and the adult high schools in Sweden, but space does not permit. In what follows, I will retrace my steps across the American Continent, Great Britain, and parts of Sweden and Belgium, selecting mainly those aspects which have a bearing on my main problems.

"Campus Crawl"

My trip might aptly be called a "campus crawl," as most of the places I visited were university laboratories, and "campus" is American for the site of a university. The first university visited was at Davis, California, not far from San Francisco. Here I found a physiologist who refused to believe the popular idea that the letting down of milk of a cow is a conditioned reflex. When he was told of our work in New Zealand he agreed that he would have to change his views. I learned a very useful trick for injecting liquids continuously into cows. A worker using radio-active isotopes used the method with his active solutions.

Near Davis I visited some dairies using the "parlour" system of milking. In this system the cow stands on a floor about 30in. above that on which the milker stands. The milker has no stooping or grovelling about to do and the whole process is quite streamlined. With modifications it is apparent that such a system could be adopted here. A quite new type of bail for the ordinary milking shed was seen. This was a neat all-metal construction which would be less than half the cost of our metal bail systems.

At the Berkeley campus of the University of California I saw micro apparatus for perfusing the mammary glands of rats. Some experiments were seen at the Medical Centre, San Francisco, which may throw some light on why cows become strippy toward the end of the season.

From San Francisco I went to the twin cities St. Paul and Minneapolis. I lived near the farm campus of the university and travelled about in the state quite a lot. I saw work on the perfused cow's udder and experiments on machine milking. I was also able to study a mass-production factory making milking machines. This gave me quite a number of ideas for improved ways of making milking machines. At Rochester I visited the Mayo laboratories and learned a lot about new instruments, some of which will help us in our studies of the cow's udder.

Experiments on Machine Milking

My next campus was at Madison, Wisconsin. Here I saw experiments on machine milking, new ways of handling cows in the barn, and time motion studies in the milking parlour. I was lucky to meet some psychologists who had worked with conditioned reflexes in dogs, cats, rats, and monkeys. They were also interested in cows. These discussions led to some new ideas for work on cows in the shed at milking time. As the pituitary gland is probably involved in the milking process, I visited the Mayer packing plant to see how pituitary glands are removed on a mass-production basis.

The journey from Madison brought me to Chicago. Here we had a conference of the three largest makers of milking machines. Here also I saw streamlined dairies, one fitted with plate-glass windows and a cocktail bar! At the university I met one of the world's authorities on the pituitary gland and also learnt about new work on milk secretion using radio-active substances.

On my way south I stopped a few days at Urbana, Illinois. Here I met the scientist who, away back in 1915, suggested the mechanism by which milk is ejected from the mammary gland. He plotted the first milk-ejection curves and laid the foundations for modern theory and practice. At Urbana I was able to study two new American milking machines under test.

From Urbana I went to Columbia, Missouri. My visit here enabled me to collect hundreds of references to the literature on milk secretion which are not available in New Zealand. By following the usual procedure in the dairy department at the university of working every day of the week, with a half day off on Sundays, I was able to get a lot of work done. At Columbia I saw the work on the effect of environment on the cow. Two barns are set up to work from temperatures below freezing to over 100 degrees F. The physiological properties of the cows and their productive efficiency are studied under different climatic conditions.

After Columbia came Manhattan, Kansas, a small university town quite unlike its namesake of the east. At the university I found work on machine milking going on and met some interesting people studying animal behaviour.

Informative Conference

On leaving the south I went back to Minneapolis to the American Dairy Science Association meeting, where well over 1000 dairy scientists assembled from all over the union. This was a very stimulating and informative conference.

A short visit to Washington, D.C., followed, and then I went to Ithaca to the beautiful Cornell University. This was a very fruitful visit, as I was able to spend a day on the Animal Behaviour Farm and learn about ways of studying farm animal psychology. In addition, I met workers interested in milking technique, control of mastitis, and other husbandry problems.

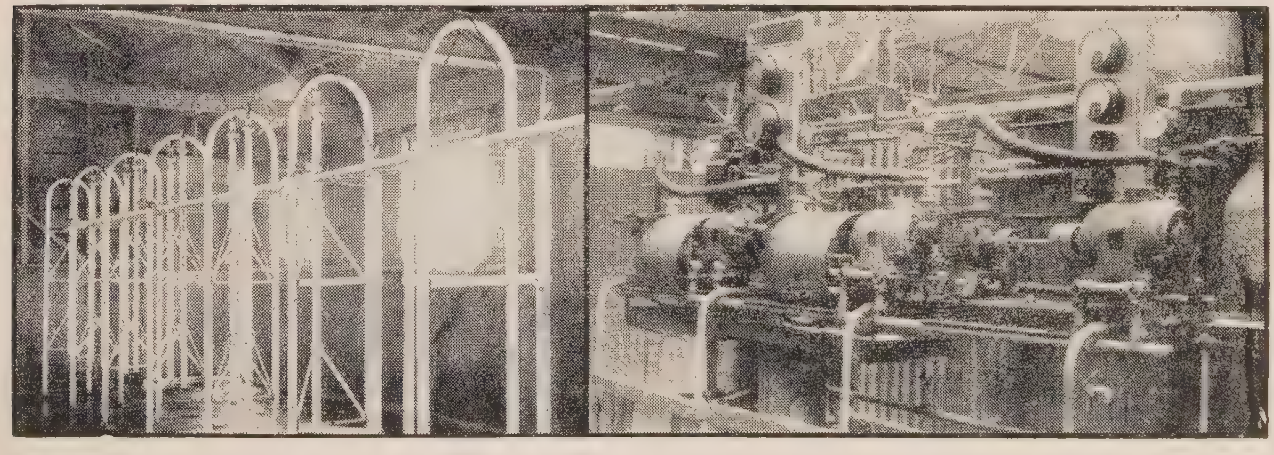
Travelling south from Ithaca brought me to New York. Here I met two more world authorities on the pituitary gland. I also visited a factory mass producing milking machines and another specialising in the manufacture of milking-machine rubber. Some new and probably very valuable ideas were seen in practice here.

And so ended my "campus crawl" of the U.S.A. Let me record briefly a few general impressions. The campus of the American university is a beautiful place. I will never forget my first morning on the campus at Madison, Wisconsin. As I walked up a hill—for the campus is quite hilly—I was greeted by a song from the bell tower. This had not yet faded from the air before I was again thrilled, this time by a joy to the eyes—a beautiful blue lake spread out beyond the bright green lawns and trees.

The campus at Cornell had a different sort of beauty. Overlooking the town from a great height, its buildings are scattered about on a very hilly piece of land. As one drives round its winding roads one is continually surprised. Having just absorbed the efficient elegance of a new set of laboratories, one finds oneself being looked at by an old stone building peeping up the hillside from among the ubiquitous trees. Stern old buildings and slick new ones are scattered at random, but it is all beautiful. And away in the lower distance are the lake and the town—guarded, as it were, by this stronghold of learning.

Universities and the Community

Not only are the American universities physically beautiful; they are part of the community. The famous Minneapolis Symphony Orchestra is part of the university music department. It takes beauty to the community round about. So one finds the extension departments take knowledge to the ordinary folk of the community; "the boundary of the campus is the boundary of the State."



Left—A neat, simple walk-through bail. Right—Testing vacuum pumps in a modern English factory.

OVERSEAS WORK ON MILKING PROBLEMS . . .

Everywhere I went I felt that there is a live connection between the university and the community. It is said that academic standards have suffered. Even if this is true, perhaps the gain to the community in a wider diffusion of knowledge and the enriching of the lives of the people who really count, the working folk who create the material basis of our modern community, has been worth the sacrifice. The American university is thoroughly democratic, and the man who has worked up from lowly origins to a position of responsibility and importance is held in the highest respect. In a discussion on the role of the university in the community President Milton Eisenhower, Kansas State College, told me that in his opinion the most important job of the university in the future is adult education, because on the level of understanding of its citizens depends the success of a real democracy.

My English tour started with a few days in London during which time I organised my itinerary. From London I went to the National Institute for Research in Dairying near Reading. This was a very profitable visit. Here I learned about recent work on milk coolers, milking methods, and physiological problems related to milk secretion. From Reading I went to other laboratories working on mastitis control and found some extremely valuable work being done. Two groups of workers have studied how mastitis can be controlled under well supervised field conditions. In collaboration with the National Institute for Research in Dairying some work is being started on the role of the milking machine in spreading mastitis.

World Dairy Congress

I left Reading for Stockholm, arriving a few days before the World Dairy Congress. During these days I visited dairy farms and laboratories. The Swedish workers, like ourselves, are suspicious of many of the simple doctrines about milking which have come from America and like ourselves are doing experiments which suggest that some of the American ideas are not correct. The standard of work in Sweden is high and I was most impressed by the broad knowledge and critical outlook of the workers I met. I was amazed at the similarity in outlook between ourselves and the Swedish people. They are friendly, helpful, and lack that strange kind of superiority which is assumed by some Englishmen when dealing with "colonials." My visits to laboratories near Stockholm were exceptionally profitable and pleasant. Many of the workers simply bubbled over with enthusiasm and were keen to tell me everything they knew. The problems studied ranged from milking methods to the perfusion of dogs' brains. This latter work is of importance because it involves methods which could be applied to mammary glands.

The congress was an exciting experience. Meeting famous people who had hitherto been but names in bibliographies was quite an adventure. Discussing problems with them was most valuable even if much of the talking had to be done with hands as well as tongues! I came back to England from Stockholm overflowing with new ideas and full of affection for the busy city and the charming, hard-working people.

Biochemical Congress

My leaving the congress in Stockholm a day or so early was necessitated by the commencement of the Biochemical Congress in Cambridge. Here for the first time in my travels my first invitation card required me to turn up in evening dress and decorations. Like many other colonials and foreigners, I had left mine behind and, emboldened by the company of an Australian, went in "mufti" to feel a bit like a poor relation.

The congress was an excellent opportunity to meet workers from all over the world. Many of the papers given were disappointing because of their being apparently out of touch with the urgent problems of the day. However, there were some first-rate contributions. Of great interest to me was an English paper criticising certain American work on milk secretion. The English workers had shown that the Americans were using a method of analysis which did not estimate the substance they were looking for! One point which was driven home by discussions at the congress was how important it is to investigate the fundamentals of a problem before trying to solve the practical side. In the field of milk production and secretion this point is well illustrated. Those of us who have been trying to solve the practical problems involved have been "led up the garden path" by assuming the truth of theories which will not stand fundamental criticism.

From Cambridge I went to Ghent in Belgium. Here I found myself welcomed into a group of keen workers at the Veterinary School and took part in a complex mammary perfusion experiment. In a few days I learned a lot of new facts and found that this careful Belgian work raised many doubts about the truth of some of the American work on milk let-down. My stay in Ghent was both enjoyable and very helpful. Again I felt at home. Perhaps the little countries are more friendly, as they cannot assume they are superior to everyone else.

Scottish Milking Methods

From Ghent I went to Aberdeen, a lovely city in another land with a "little country" outlook. Near Aberdeen I saw work which raises some important points in connection with "pepping up" cows with iodinated protein. I was also able to study Scottish milking methods.

From Aberdeen I went to Edinburgh. Here I learned about recent work on milking machines and mastitis and was taken to see the latest milking methods and premises. At the university I was shown an important new method of estimating adrenalin in blood. This is directly connected with the problem of why a cow holds up her milk. The time in Edinburgh was very productive of new knowledge and stimulating ideas.

Next I went to Ayr to hear about some good work on mastitis and milking methods. As in other parts of Scotland, I was greeted by enthusiastic people and felt very much at home. I left Scotland feeling optimistic about mastitis control and with a few clues as to the role of machine milking in spreading the disease. This impression was strengthened by a brief visit to the group at Nottingham, where the Boots organisation has a research farm. The problem of contamination from teat-cup liners was being studied with some success, as also was an investigation into how the mastitis organism spreads in a herd milked by machine.

At Oxford I found much stimulation and many new ideas in the Pharmacology Laboratory. Improved methods for estimating the posterior pituitary hormones were studied and new light thrown on some of the puzzling problems of the pituitary body.

Back in London I rushed about on problems varying from electronic control mechanisms to milking-machine rubberware. Having had a few doses of food poisoning due to the fact that a hot, long summer is unsuited to British rule of thumb methods of handling food, I was happy indeed to relax on board the elegant and comfortable Himalaya on her maiden voyage to Sydney.

Developments in Australia

Leaving the boat at Melbourne, I spent a little time looking at Australian milking methods. The ingenuity of some of the Australian machines surprised me. Some of the new ideas are good and will certainly be tried here. Near Sydney, my last stop on the trip, I saw important developments in the field of milk measurement. Again I saw Australian farmers at work and saw how they produce quality milk with poor water supplies and high temperatures.

One idea which may be helpful was that of using a special type of pump hitherto used only in chemical and related industries as the vacuum pump on milking machinery. This is to be tested as soon as we get a pump.

Obviously the trip has resulted in a welter of new ideas to be tested and of tested ideas from other countries to be applied in our own. Some of the more obvious lines of development which should be explored here are: The use of modern plastics and synthetic rubbers on milking machinery; improved types of vacuum pumps; the "raised bail" or "parlour" milking method; "in can" cooling of milk while under a vacuum; simplified mass-producible components for milking machines.

On the theoretical and applied physiology side it is evident that much more work must be done before we understand how a cow lets down her milk. The views we have been taught so far are not complete. We have learned new methods of attack on the problem and the nature of our difficulties has to some extent been defined more clearly. Our next task is to investigate the fundamental problems with the thoroughly critical approach which is essential if we are to avoid the over-simplifications which have befogged our task in the past.

The Care of Pig Litters during Winter

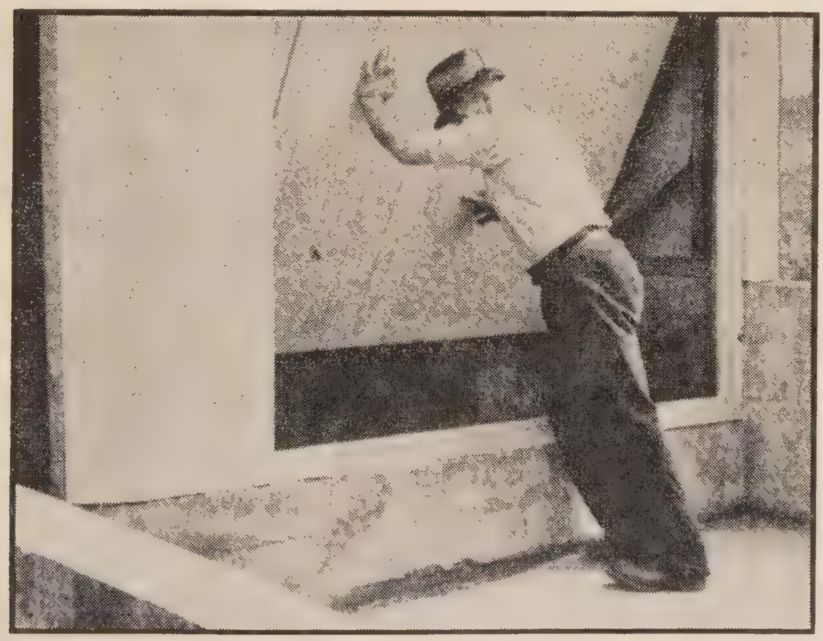
SOWS should farrow in May if their litters are to fit in with the supply of dairy by-products available for pig feeding. These litters are on the sow during the winter and their care and management are discussed in this article by I. H. Owtram, Extension Officer in Pig Husbandry, Department of Agriculture, Wellington.

[*National Publicity Studios photo.*

During winter every advantage should be taken of sunshine, as little pigs derive great benefit from basking in it.

LITTERS born during May and June are faced with winter conditions and of first importance in their successful management is the necessity for keeping them warm. In most districts frosts are likely in winter and frosts constitute a danger to new-born pigs. When a sow is due to farrow at this time care should be taken to see that the house in which she is to farrow is as warm as possible and that new-born pigs cannot wander outside the house, as they will have difficulty in finding their way back. If they get out on a frosty night they will certainly not be alive in the morning. A suitable length of 4in. x 1in. timber temporarily fixed across the doorway or open front of the house will prevent piglets from getting out of the house, and the sow will be able to step over it without difficulty.

A farrowing house equipped with shutters by which the opening in front can be closed is a great advantage in winter. Bedding should certainly be provided in winter, but tact and discretion must be used. It is natural for a sow to make a nest for herself at farrowing time and a certain amount of bedding should be given her for that purpose. But she should be watched unless she is a sow whose habits are known. Bedding should be placed in the house in good time in order to give the sow a chance to deal with it, particularly when hay is used, as piglets can very easily get tangled up in loose hay. If bedding has been put into the house some days before the sow is due to farrow, she will have got it well consolidated by the time the pigs are born. Clean straw, if it can be obtained, is best, but shavings from a planing machine are also very good. One of the great advantages of these two materials is their freedom from dust.



[*"New Zealand Farmer" photo.*

A farrowing house equipped with shutters by which the opening in front can be closed is a great advantage in winter.

Access to Pasture

Access to good pasture is just as important in winter as at other times, but the pigs must be carefully controlled. On fine days the sow and litter should be out for a run as soon after the litter has been farrowed as possible; in cold, wet weather, however, they must be kept inside. If a spell of bad weather makes it impossible to let them out for some days, a clean turf should be dug and placed in the house. Piglets when first they get out eat quite considerable quantities of earth, and it is generally thought that they obtain some necessary elements in this way. It is good practice to place clean turf in the house for them to play with, as it tends to prevent anaemia and scours.

Sow's Food Supply

The feeding of sows and litters in winter has to be rather different from feeding at other times because little skimmed milk and whey is available. On most dairy farms there is a small quantity of skimmed milk for feeding to pigs, but it is generally inadequate. The sow's ration should be at the usual level, that is, 1 food unit for each

CARE OF PIGS IN WINTER . . .

piglet in the litter and at least 4 units for her own maintenance. If crops have been grown on the farm, the bulk of the sow's ration can be supplied in this way. Sugar beet, carrots, or kumikumi are most useful for this purpose. Where maize, barley, or peas are grown very little trouble is experienced, as a good grain concentrate is on hand.

Maize, barley, or peas are all improved by being crushed or ground, which can usually be done at a local merchant's premises quite cheaply. In feeding home-grown grains to piglets in the creep it is best to use grains in the crushed or ground form; if not in this form, grains should at least be soaked for 24 hours before being fed. Though maize can be fed on the cob either soaked or unsoaked, the grinding of maize into meal without shelling it produces a most satisfactory meal. It is generally known as cob maize meal and 25 per cent. more meal is obtained than when the same quantity of shelled maize is ground. No such meal is marketed, but farmers growing maize can arrange grinding of the cobs. The cob itself provides roughage, which is most useful, and some minerals. Cob maize meal is used quite extensively in the U.S.A. and has been used here with excellent results. It is a good meal for feeding in the creep.

When no skimmed milk is available for the sow half her total ration should be in the form of concentrates (meat meal, grain, or grain meal) and, if it can be obtained, a little tallow should be fed. The balance of her ration can be roots and, where it is available, good pasture. Too often sows are grazed on poor pasture yet are expected to do well on it.

Feeding half the ration of meal as a warm slop (meal mixed with warm water) for the last feed of the day is a very sound policy. The provision of clean drinking water at all times is more than ever necessary when there is no milk, because just as cows will not milk well without a good supply of drinking water, neither will sows maintain their milk supply without it.

Creep Feeding

Special attention to the creep feeding of the litter should be given at this time of year. Any skimmed milk should be reserved for use in the creep. Meat meal should be used at the usual rate, starting with 2oz. a day per piglet from the time piglets are 3 weeks old and increasing the ration to ½lb. per day at 8 weeks. Grain or grain meal, if available, should also be used, starting with 4oz. per piglet a day when piglets are 4 weeks old and increasing the allowance to 1lb. at 8 weeks. The mixing of the meal used in the creep with warm water is a sound practice. If tallow is being used, 2oz. a day should be given.

The litter will soon start eating some of the roots being fed to the sow, and a few roots should be placed in the creep.

During winter every advantage should be taken of sunshine, which is of great value at this time of year. On fine mornings all doors and shutters should be opened to allow the sunshine into as much of the house as possible, as little pigs derive great benefit from basking in the sunshine on winter mornings.

Litters farrowed in winter present no difficulty, provided that the attention to detail that is the secret of success in all farming operations is not neglected. The most important thing is to keep them warm and dry and to use the necessary amounts of concentrated foods. The cost of feeding a litter of pigs and a sow in winter is far less than that of feeding an equal number of store pigs and it involves much less work.

PEDIGREE SOW RECORDS

Contributed by the Livestock Division.

DURING the 4 months December, 1949, to March, 1950, 23 of the 24 litters recorded were sufficiently good to be included in one of the five grades set out below.

Grade	Minimum Litter Weight	
	At 3 weeks	At 8 weeks
1	120lb.	360lb.
2	100 ,,	300 ,,
3	90 ,,	270 ,,
4	80 ,,	240 ,,
5	70 ,,	210 ,,

Breed Averages for the Period

Breed	No. of Litters Recorded	Litter Weight at		Number of Pigs		Average Weight at	
		3 weeks	8 weeks	Born	Weaned	3 weeks	8 weeks
		(lb.)	(lb.)			(lb.)	(lb.)
Berkshire ..	4	107.0	344.5	9.5	7.7	13.81	44.45
Large White ..	20	123.9	393.8	11.0	9.1	13.62	43.27

A No. 3 grade is regarded as good, No. 2 as excellent, and No. 1 as special.

The following list gives the names and addresses of the breeders of recorded sows and details of the litters:—

Owner's Name and Address	Herd Book No. of—		Litter Weight at		No. of Pigs		Grade of Litter
	Sire	Sow	3 weeks (lb.)	8 weeks (lb.)	Born	Weaned	
Berkshire							
Hope, W. D., Old Taupo Rd., Rotorua	22254	23421	116	434	9	9	2
Quinn, J. E., Kerepehi, R.D. Paeroa	23725	22571	46	167	9	4	—
Snelling, F. R., R.D. Whakatane	23620	23861	145	378	9	9	1
Ellerm, O. C., R.D. Palmerston North	25307	24738	121	399	11	9	1
Large White							
Vickers, H. E., Box 554, Hamilton	7977	7234	135	427	11	9	1
Quinn, J. E., Kerepehi, R.D. Paeroa	6908	7437	102	303	10	8	2
Quinn, J. E., Kerepehi, R.D. Paeroa	6908	6919	96	358	12	9	3
Quinn, J. E., Kerepehi, R.D. Paeroa	6908	7067	113	379	11	9	2
Goymer, T., Lower Mangorei, R. D. New Plymouth ..	7567	7925	185	640	12	11	1
Haydon, G. C., P.B., Greymouth	6129	7596	136	349	7	7	2
Haydon, G. C., P.B., Greymouth	7675	7376	128	418	12	8	1
Haydon, G. C., P.B., Greymouth	7675	7748	142	427	12	9	1
New Plymouth High School Board, Box 187, New Plymouth	7566	7916	109	440	12	12	2
New Plymouth High School Board, Box 187, New Plymouth	7566	7934	117	396	15	11	2
New Plymouth High School Board, Box 187, New Plymouth	6961	7934	167	438	14	13	1
New Plymouth High School Board, Box 187, New Plymouth	6961	7287	119	351	8	7	2
New Plymouth High School Board, Box 187, New Plymouth	7567	7916	106	337	8	8	2
New Plymouth High School Board, Box 187, New Plymouth	7567	7909	106	353	10	8	2
Ireland, G., R.D. No. 2 Putaruru	7586	7585	138	515	15	14	1
Harper, L. M. and R. J., Waiterimu, R.D. Ohinewai	7836	8230	130	408	12	9	1
Harper, L. M. and R. J., Waiterimu, R.D. Ohinewai	7836	7305	118	387	10	8	2
Davies, T. L., Ngahinepouri, R.D. Ohaupo	8520	7788	117	381	13	8	2
Robinson, R., Nukuhou North, R.D. Waimana	8532	8544	100	223	8	7	5
Robinson, R., Nukuhou North, R.D. Waimana	8532	7185	114	346	8	7	2

History of New Zealand Milking Shorthorns

THE early history of Shorthorn cattle both in New Zealand and overseas was dealt with in last month's "Journal" by J. M. Ranstead, of Matangi, in the first of a series of three articles on New Zealand Milking Shorthorns. In this, the second of the series, the author traces developments in a later period.

Melba's Prince, one of the Darbalara bulls imported by the New Zealand Government in 1911.

MR. W. M. SINGLETON, then Assistant Director of the Dairy-produce Division of the Department of Agriculture, who had played a great part in the development of the cow-testing associations, was impressed with the value of purebred sires of the special-purpose dairy breeds and never lost an opportunity of advocating their use by dairy farmers. But he also recognised that pedigree does not always mean performance and he considered that the compilation of duly authenticated milk records would tend to popularise the particular breeds concerned, safeguard the dairyman against the purchase of the wrong class of animals, facilitate the sale of stock between breeders themselves, and probably pave the way for a remunerative export trade in purebred dairy cattle.

The matter was brought under the notice of many owners of purebred dairy cattle of the various breeds and most of them agreed that semi-official records of performance would prove beneficial. Mr. Singleton therefore drew up a basis on which the work might be undertaken for the consideration of the associations of registered purebred dairy cattle. In 1912 details were placed before the Ayrshire and Holstein-Friesian associations at their annual meetings held in Palmerston North during the course of the National Dairy Show. The matter was discussed fully and the Holstein-Friesian breeders agreed to adopt the system. But the Coates' Herd Book Shorthorn breeders did not take the matter up; they were interested mainly in beef production and were not sufficiently interested even to form a breed society.

Registration of Non-pedigree Cattle

The herds of dairy Shorthorns that were being developed at the Government farms were not eligible for semi-official testing, one of the conditions of entry being that only such cows would be tested "as are duly and properly registered in the New Zealand Herd Book of the breed to which they belong." This led, early in 1913, to Mr. E. Clifton, Director of Experimental Farms, advocating the registration of non-pedigree dairy Shorthorns. He said:—

> In New Zealand are many herds of great milking capacity that are to all intents and purposes true Shorthorns. They may be described as unregistered. It is the owners of these cattle who should associate their interests and register their stock. This would increase the value of such herds; the stock would be known. It would also obviate the difficulty, well known to breeders of this type of cattle, when a bull is wanted of knowing where to find it. A well-known dairyfarmer whose herd is Shorthorn was recently asked: "Where can a bull of a milking family of this breed be purchased?" The reply was: "I do not know; you must do as I do: when I replace a bull I take my chance." Surely this should be altered. A society of breeders of this type of Shorthorn should be formed. The admission of stock to the register would depend on the production of a defined quantity of milk, and the conformance of the individual to the Shorthorn type. At present the herd-book of this breed is a valuable guide to the grazier; there the descent of stock famous in the showyard can well be made; but there is no guide to the cow or bull for a dairyfarm. It is the utility cow that is in demand, and there are farmers who believe this to be in the stock of the Shorthorn type.
>
> It is suggested that the dairy farmers who may approve of this proposal to form a Milking Shorthorn breeders' society should move in the direction of forming a society on the lines of the Ayrshire, or Holstein, or Jersey societies. The next large gathering of farmers will be at the winter shows of Dunedin and Manawatu. Possibly someone interested will there propose and arrange to form a society of breeders of the Milking Shorthorn (8).

Milking Shorthorn Associations

Probably as a result of this appeal, Mr. Edward Law, of Shannon, convened a meeting to be held at Palmerston North on June 19, 1913, during winter show week. The meeting was duly held and was well attended. Besides Mr. E. Clifton, Director of Experimental Farms, Mr. W. M. Singleton, Assistant Director of the Dairy-produce Division, and Mr. J. Drysdale, Manager of the Weraroa Experimental Farm, there were present Messrs. E. Law, G. N. Wood, P. W. Inge, M. Moynihan, of Shannon, W. E. Barber, of Foxton, J. Grant, of Woodville, J. C. Wright, of Taranaki, J. C. Potts, of Waikato, and several other owners of Shorthorns.

Mr. Law, who was voted to the chair, explained that the meeting had been called to discuss the advisability of forming a Milking Shorthorn Association. Mr. Clifton, Mr. Singleton, and several others addressed the meeting and urged the formation of such an association. A resolution was then proposed and carried, "That this meeting form a Milking Shorthorn Association." A committee was then formed to arrange the drawing up of rules, etc.

In the Waikato also great interest was taken in the new movement and at the Hamilton Winter Show, held a fortnight before the Palmerston North Winter Show, a similar meeting had been held. This meeting was convened by the Waikato Agricultural and Pastoral Association at the request of Mr. John Allen, Annandale, Morrinsville. Among those present were Messrs. J. Allen, E. Allen, A. D. Bell, T. C. Blackett, J. Fisher, R. Fisher, H. Giles, G. Hall, T. Hinton, P. McConnell, W. G. Park, J. C. Potts, T. Moisley, J. M. Ranstead, and many other dairymen interested in Shorthorn cattle. Mr. Singleton, Assistant Director of the Dairy-produce Division, was present by invitation and explained the rules for semi-official testing.

At this meeting the Waikato Dairy Shorthorn Association was formed. Some of the objects for which the association was established and decisions it made were:—

> To maintain the purity and improve the breed of Dairy Shorthorn cattle in New Zealand.
>
> To collect, verify, and publish information relating to Dairy Shorthorn cattle and to compile and publish a herd book of Dairy Shorthorn cattle in New Zealand.
>
> To co-operate with any other society having similar objects and to procure from and communicate to such society such information as may seem likely to promote the objects of the association.
>
> Inspectors shall be appointed who are competent judges of Dairy Shorthorn cattle, and whose duty will be to inspect and certify that the animals which the owners wish to enter in the Dairy Shorthorn Herd Book are of good and true type.
>
> The standard of butterfat production shall be not less than 300lb. per annum from a mature cow of 5 years or older.
>
> It is recommended that heifers calve at 3 years old, and the butterfat yields for the ensuing year shall be 234lb. increasing by .09 per day until at the age of 5 years that yield will be 300lb. of butterfat per annum. Where it is possible official tests will be made. Failing being able to have official tests made, owners can have their cows tested by butter factory or creamery managers, the owners and managers to make a declaration that the testing as carried out by them is true and correct in every particular.

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8. Clifton, E. (1913): "The New Zealand Journal of Agriculture," volume 6, page 170.

Mr. J. C. Potts was appointed secretary of the Waikato Dairy Shorthorn Association and a fortnight later attended the inaugural meeting of the New Zealand Milking Shorthorn Association at Palmerston North. There he explained what had been done in the Waikato and on his return he reported the formation of the second association to his Waikato committee. It seemed unnecessary that two associations should be established for the same purpose, so in 1914 Mr. T. Hinton, president of the Waikato Dairy Shorthorn Association, attended the first annual meeting of the New Zealand Milking Shorthorn Association and proposed that the two associations should amalgamate. Negotiations were begun immediately, but were not completed until 3 years later when the Waikato Dairy Shorthorn Association was absorbed and became a local branch of the New Zealand Milking Shorthorn Association.

The differences that kept the two associations apart finally resolved themselves. The Waikato conditions of entry were so difficult to comply with that very few entries were received. It was necessary that besides passing inspection for type, the cow should have a certified yield. Cow testing had only recently been introduced and few of the herds were tested, so that up to the time of amalgamation only 185 authenticated records of production had been received. These records were published in volumes 3 and 4 of the New Zealand Milking Shorthorn Herd Book and but for the amalgamation would probably never have been published. After the amalgamation, when entries were accepted on type without records of performance, there was a flood of entries from the Waikato.

The Waikato Dairy Shorthorn Association's proposals were outlined at its first annual meeting:—

> The secretary stated that it was proposed to breed from the best milking cows procurable by a purebred bull. The progeny of these were to be bred for three or four generations until the desired type of animal was obtained. A desultory discussion followed, during which it was pointed out that if the New Zealand Association were going to insist absolutely on their rule re pedigree cows only being admissible, it would be no use for the Waikato men to affiliate, for pedigree milking Shorthorns were not to be had in New Zealand. The Waikato men would have to lay their own foundations and start on similar lines to those adopted at the inception of the Clydesdale Association. If they did that, they would be able, in the course of a few years, to build up the kind of animal required, and eventually buyers would come to them from other parts to purchase milking Shorthorns (9).

On the other hand, until the first volume of the New Zealand Milking Shorthorn Herd Book appeared in 1917, it was not clear what the conditions of entry were. Extracts from the first minute book of the association show that resolutions were passed:—

> **February 26, 1914:** That all cows nominated by members of the association must be passed by an approved judge before they are eligible.
>
> That bulls eligible for registration in the Herd Book must be pedigree bulls of a milking strain, passed by a judge and finally passed by the council.
>
> **June 18, 1914:** That four generations for females and four generations for bulls should qualify an animal for pedigree purposes.
>
> **July 16, 1914:** That no cross-bred females shall be accepted for the Herd Book.
>
> That only animals that have passed the S.O. Test according to age be accepted for the advanced register.
>
> That non-pedigree stock will be accepted in the appendix to Vol. 1 and may be raised to Sec. 1 in Vol. 2 on more particulars of breeding being furnished or on certificates of the breeder.

[*From "The New Zealand Farmer" (1917).*

Mr. A. E. Fear's non-pedigree Milking Shorthorn cow, champion at Waikato show, 1916. This cow was refused admission to the newly formed New Zealand Milking Shorthorn Association's herd book because of her black nose.

> **November 4, 1914:** That the Association go on the lines already laid down and we have no appendix to the Herd Book.
>
> That the Association only accepts pedigree bulls, that unless the cow is a pedigree animal the bull calf could not be accepted.
>
> **March 11, 1915:** A discussion took place on the question of only pedigree bulls being accepted for the herd book. Several entries of bulls had been accepted for which the pedigrees of the dams were unobtainable. It was eventually decided that the regulation passed at the meeting on the 26th of February, 1914, re accepting only pedigree bulls for the Herd Book be amended and that bulls by pedigree sires from a purebred Shorthorn dam of Milking Shorthorn strain be accepted, provided they are passed by an appointed judge of this Association, and to be finally passed by the Council. Sires and dams at least for two generations on the dam's side to be produced or declared by the owner that the said dam is purebred, to the satisfaction of the judge appointed.
>
> **June 18, 1915:** The President, Mr. E. Law, reported on a visit to Dunedin and interviews with several breeders in the South Island.

Canterbury Breeders' Decision

Very little or no interest was taken by the South Island breeders in the proposal to found a new herd book for Milking Shorthorns, even though based on non-pedigree females graded up by pedigree sires, as was originally proposed at Palmerston North. Such cattle were already eligible for Coates' Herd Book, 4 top crosses of pedigree sires rendering a female eligible, and a bull calf with 5 top crosses was also eligible.

Whether or not South Island breeders were moved to take action by the activities of the New Zealand Milking Shorthorn Association, with which they disagreed, in November, 1914, a meeting of breeders was held in the Canterbury Agricultural and Pastoral Association's rooms, Christchurch, when it was decided to form the New Zealand Shorthorn Cattle Breeders' Association. Arrangements were made by the new association to purchase the copyright of the New Zealand Shorthorn Herd Book and to carry on the publication. It was decided that: "Should breeders desire, the Council will publish results of semi-official tests in the Herd Book."

Early Herd Books

The New Zealand Milking Shorthorn Association published the first volume of its herd book in 1915. It was only a small volume, the entries coming mainly from the Manawatu and Taranaki, only a few from the Auckland Province, and none from the South Island. Perusal of the entries makes it evident that a departure had been made from the original idea of developing a dairy strain of the Coates' Herd Book Shorthorn. Among the entries that had been accepted were Illawarra cattle which definitely contained foreign blood, Lincolnshire Red Shorthorns which Coates' Herd Book would not recognise, and grade Shorthorn bulls which in many cases were unknown quantities as far as their breeding went.

The entries for volume 1 comprised 50 males and 358 females made up as follows:—

MALES

Coates' Herd Book Shorthorn ..	11	
Coates' Herd Book Shorthorn (grade)	4	
	—	15
Lincolnshire Red Shorthorn ..	3	
Lincolnshire Red Shorthorn (grade)	10	
	—	13
Illawarra Shorthorn	9	
Illawarra Shorthorn (grade) ..	5	
	—	14
Non-pedigree Shorthorn		8
		50

FEMALES

Coates' Herd Book Shorthorn ..	42	
Coates' Herd Book Shorthorn (grade)	83	
	—	125
Lincolnshire Red Shorthorn	2	
Lincolnshire Red Shorthorn (grade)	10	
	—	12
Illawarra Shorthorn	20	
Illawarra Shorthorn (grade)	6	
	—	26
Non-pedigree Shorthorn		195
		358

Volume 2, which followed in 1918, contained entries of 241 males and 2257 females. The increased numbers were due largely to entries from the Auckland Province following the amalgamation with the Waikato Dairy Shorthorn Association. The entries were made up as follows:—

---

9. "The New Zealand Farmer," August, 1914

MALES

Coates' Herd Book Shorthorn ..	23	
Coates' Herd Book Shorthorn (grade)	63	86
Lincolnshire Red Shorthorn ..	1	
Lincolnshire Red Shorthorn (grade)	19	20
Illawarra Shorthorn	31	
Illawarra Shorthorn (grade) ..	62	93
Non-pedigree Shorthorn		42
		241

FEMALES

Coates' Herd Book Shorthorn ..	13	
Coates' Herd Book Shorthorn (grade)	363	376
Lincolnshire Red Shorthorn	1	
Lincolnshire Red Shorthorn (grade)	25	26
Illawarra Shorthorn	19	
Illawarra Shorthorn (grade) ..	114	133
Non-pedigree Shorthorn		1722
		2257

Volume 3 was published in 1919, the entries comprising 427 males and 6747 females. With the exception of a few new Coates' Herd Book entries the bulls entered were the progeny of sires and dams already registered in the New Zealand Milking Shorthorn Herd Book; the females, however, were mostly non-pedigree.

Dispensation for Ex-servicemen

After the closing of volume 3 it was decided that in future the herd book should be closed to non-pedigree entries. Later, this rule was relaxed in the case of females owned by returned soldiers who had not had the opportunity of entering stock. They were allowed to enter, subject to inspection for type, up to 10 females per soldier. However, the number of these entries was not very great, the total being less than 500, spread over volumes 4, 5, 6, and 7.

The following statement appeared in the introduction to volume 6 (1925):—

> The inspection of animals for future registration is to be discontinued; the entries will be accepted on pedigree records. We would ask that the members continue to take the same care and attention to breeding and the improvement of their herds as in the past, and assist the Association in maintaining the highest standard possible.

In volume 8 (1927) appeared the particulars of a scheme for grading up non-pedigree cows. An appendix was opened for non-pedigree cows of approved Shorthorn type that had qualified for production under Group Herd Test. The 305-day standard set ranged from 240.5lb. of fat for a 2-year-old up to 350lb. at 5 years old. Female progeny only from such cows, by registered bulls, were, subject to inspection, to be eligible for entry in the appendix up to three generations of pedigree. The fourth generation, both male and female, were to be eligible for entry in the herd book.

Two Distinct Types

From a study of the origin of the foundation stock registered in volumes 1 to 4 of the New Zealand Milking Shorthorn Herd Book it is apparent that there were two distinct types of cattle entered: First, the English dual-purpose Shorthorn, comprising Coates' Herd Book, Lincolnshire Red, and local non-pedigree cattle; and second, the Australian Illawarra Shorthorn, a special-purpose dairy animal.

The Lincolnshire Red Shorthorns were introduced into New Zealand in 1911, when Mr. W. Taylor, Greenhill, Te Awamutu, imported 1 bull and 9 in-calf heifers. These were entered by themselves in an appendix to volume 10 of the Canterbury Agricultural and Pastoral Association's Shorthorn Herd Book. In the same year, Mr. D. Buick, Palmerston North, imported 2 bulls and 1 cow, which were entered in volume 1 of the New Zealand Milking Shorthorn Herd Book.

This breed is definitely dual purpose and has taken high rank in open competitions for milking. In 1898 and 1899 Lincolnshire Reds won first and second prizes in the milking trials at the English Royal Show. At the London Dairy Show in 1900 Mr. Evans, with his Lincolnshire Reds, won first prize for best group of dairy cows of any pure breed, and at the Dublin Spring Show, 1902, he obtained first, third, and fourth prizes in the butter trials against all breeds (10).

A description of the breed, written in 1902, reads as follows:—

> A few Shorthorns of the Lincolnshire breed, founded on what is known as "The Turnell Improvement," were some years ago admitted into Coates' Herd Book. A society, however, has recently been formed (1895) to maintain the excellence and purity of the Lincolnshire Red Shorthorn breed as now established by long-continued selection and occasional introduction of blood from the Shorthorn of Durham and Yorkshire, and two small volumes of a separate herd-book for the registration of herds of that breed are already in the hands of members. The principal objects which the breeders keep in view in their selections are individual merit, in connection with long descent from known good stocks; and merit, according to the Lincolnshire criterion, comprises large frame, ample length of carcass with abundant substance, high quality of flesh, with plenty of lean to a fair proportion of fat, good dairy properties, hardy constitution and readiness to fatten. The continuity of some herds may be traced over a hundred years; other herds of later origin were founded upon selection from the best old stocks in the county (11).

The admission of these cattle, which in appearance could not be distinguished from red Coates' Herd Book animals, was readily accepted by the members of the New Zealand Milking Shorthorn Association, but when Illawarra cattle were admitted members were divided. On the one hand were those who wished to follow the Coates' Herd Book type; on the other those who wished for a strictly dairy type and were prepared, by crossing with Illawarra cattle, to found a new breed. To this day a few breeders confine themselves to Coates' Herd Book cattle and their cattle are eligible for both herd books, but the majority, by using Illawarra and grade bulls, have cut the painter.

Australian Society

The Australian Milking Shorthorn Society was formed in 1930 by the amalgamation of the Australian Milking Shorthorn Association with the Illawarra Milking Shorthorn Society of Australia. The new society published the first volume of its herd book, comprising 629 bulls and 3391 cows of registered parentage, in 1931. The registration was in 5 separate herd books, containing entries totalling 6480 bulls and 48,597 cows. The herd books referred to were the Australian Milking Shorthorn Herd Book, volumes 1 to 8, 1906-30; Illawarra Dairy Cattle Herd Book, volumes 1 and 2, 1919-21; Illawarra Herd Book of Queensland, volumes 1 and 2, 1918-22; Illawarra Milking Shorthorn Herd Book of Australia, volumes 1 to 3, 1927-31; and the Milking Shorthorn Herd Book of Queensland, volume 1, 1922.

Of the foundation stock registered in volumes 1 to 4 of the New Zealand Milking Shorthorn Herd Book, the Australian Illawarra Shorthorn bulls, imported by various breeders, were all

The noted Darbalara bull Banker (calved June 13, 1912), which was purchased by the New Zealand Government.

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10. O'Callaghan, M. A. (1912): "Dairying in Australia," page 128.

11. Housman, W. (1902): "Cattle, Breed and Management," page 96.

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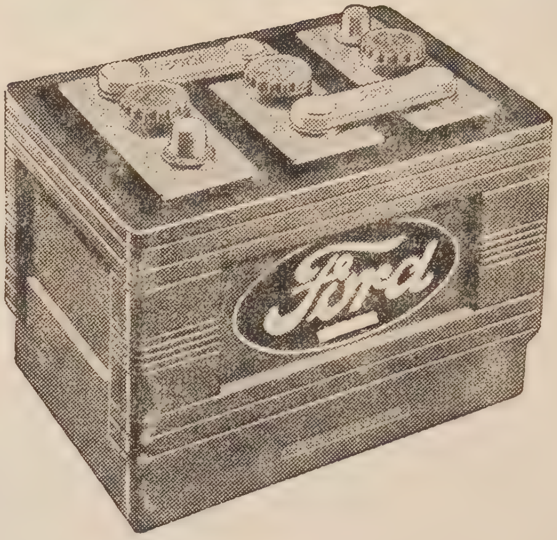

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entered in the Australian Milking Shorthorn Herd Book and all but four came from the famous Darbalara stud. These four were practically of the same breeding; two came from Mr. G. Tate and two from the Coleville stud, and it was on the Tate and Coleville stock that the Darbalara stud was founded.

Darbalara Stud

Mr. J. T. Cole, manager and founder of the Darbalara stud, tells the following story of its development:—

> The Darbalara stud herd was established in 1899 by the Scottish Australian Investment Co., Ltd., at Bolaro, an extensive property on the highlands of New South Wales, owned by the Company, where dairying was conducted on the share system in rather a large way. On taking up the management of this property the writer recommended the formation of a small stud herd, chiefly with the object of raising bulls of a high class to improve the production of the dairy herds of Bolaro, and also of Talgai West, in Queensland, where the company was also carrying on extensive dairying operations. Having then had over thirty years' experience of the old "dual-purpose" Shorthorn, I was satisfied they were the most suitable breed for the company's purpose; and, in making the selection of the foundation stock for the stud herd, I obtained the best available of the old strain, that I personally knew went back to the "dual-purpose" Shorthorn type imported from England in the first half of last century, and which, for fifty years, had proved their worth as heavy producers of milk and butter. I was careful to avoid Scotch blood, or any infusion of the modern "beef Shorthorn." The kingpin of the herd, "Banker of Bolaro" (No. 5 MSHB) I had bred myself before taking up the management of Bolaro. The foundation dam, "Madame of Bolaro" (406 MSHB), I purchased from a life-long friend, the late Mr. George Tate, Jnr., of Kangaroo Valley, who was a most successful breeder of milking Shorthorn cattle, as was his father before him. He never missed an opportunity of securing high-class Shorthorn stock of imported descent for his herd, and was one of the leading exhibitors at the shows in the south coast district of New South Wales since the '60's of last century.
>
> Madame, mated with Banker, nicked splendidly with him, and her first calf was the foundation cow Melba of Darbalara, one of the finest producers I have ever seen and an outstanding animal in frame and constitution as well as quality. The first bull calf by Banker from Madame was the famous champion bull Emblem of Darbalara—Champion at the Royal Agricultural Society's Show at Sydney, from 1910 to 1916 (inclusive), or seven years in succession—a world's record. Emblem, mated with Melba IV—daughter of Melba—produced Melba VII, which, mated with Kitchener—by Emblem ex Lily II, produced the world's champion cow Melba XV of Darbalara. Lily II was by Heather of Bolaro—the sire of Madame—from Lily of Bolaro by Banker.
>
> From the foregoing particulars it will be seen that Melba XV of Darbalara is closely line-bred to Madame and Banker (12).

Blending of Breeds Possible.

Although Mr. Cole and the Milking Shorthorn Association of New South Wales were emphatic that their cattle were the descendants of the Shorthorn cattle imported to Australia in the first half of the 19th century and that it was because of the carelessness of the early pioneers that the pedigrees had not been recorded, there is a possibility that there may have been a certain amount of blending with other breeds, Ayrshire in particular. Banker and Madame both claim descent from Major (imp.), but they also trace to the stock of Mr. A. McGill.

With regard to the above, the secretary of the Illawarra Dairy Cattle Association, said:—

[From "The New Zealand Farmer" (1915).

Melba III of Darbalara, dam of Melba's Prince, the Australian Illawarra Shorthorn bull which was imported by the New Zealand Government in 1911.

> We do not recognise the bull called "Major" as the origin of the Illawarra breed of dairy cattle. The bull was one animal, and one only, among hundreds of bulls that have been used for breeding purposes in the Illawarra district. Neither do we advocate the use of Shorthorn, Ayrshire, or Devon bulls. But we are honest enough to admit that 65 to 70 years ago, and later, the blend of blood that was prominent in Andrew McGill's herd—those deep red cattle with a white blaze on the flank or side—was worked in from three strains, etc. (2a).

Of those three strains Mr. A. McGill's son Duncan said:—

> My father did not commence dairying on his own account until 1846. At the homestead at the time we went to live on Hopping Joe's Meadow there were three bulls. A long horned bull of the Craven breed, with hooped horns, white face, a dorsal streak, and reddish brindle sides. He was known as the "Bally bull." A red bull with brindle streaks, named "Blucher," and a large strawberry Durham had just been leased for a season from Henry Osborne. To the best of my belief those three bulls laid the foundation of my father's herd (2b).

The Sydney "Live Stock Bulletin," August 1, 1939, in recalling the basis of Melba XV's breeding, asserted that Banker's grandsire, William, bred by Mr. A. McGill, was by Sir William, an Ayrshire bull in the herd of the late Mr. W. Moles, and also that Melba XV, through Carbine, the sire of Melba IV, traced back to the imported Ayrshire bull Duke of Argyle.

Importations to New Zealand

The possibility that the foundation stock of the Darbalara stud might contain traces of Ayrshire or other foreign blood weighed lightly with the New Zealand Government when, in 1911, the decision was made to import a shipment of these cattle. The Department of Agriculture had abandoned its attempt to develop a dairy strain of Coates' Herd Book Shorthorns and the Dairy-produce Division was advocating the use of Friesian, Ayrshire, and Jersey sires on the local Shorthorn dairy herds, so why not try the Illawarra that was doing so well in Australia?

That the Illawarra could more than hold its own with the other dairy breeds in Australia was shown by the record of Melba III, dam of Melba's Prince, one of the two Darbalara bulls imported, together with nine heifers, by the Government. This cow headed the list in the first year of the tests conducted by the New South Wales Department of Agriculture in connection with the United Purebred Cattle Association's register. The 9 months' record showed that Melba III gave 13,753lb. of milk, equal to 582lb. of butter. She finished the full year's test with a record of 15,233lb. of milk, equal to 653.89lb. of butter. In this official test 319 cows took part—59 Shorthorns, 17 Guernseys, 238 Jerseys, and 5 Holsteins. The second-best cow, a Jersey, yielded 6685lb. of milk, estimated to contain 481lb. of butter, in the 9 months (13). The other bull imported was Buttermore, by Emblem. Thus the New Zealand Government obtained some of the very best blood that Darbalara could supply, for the Emblem x Melba combination in later years produced the Darbalara cows that made the stud world famous. Emblem was the sire of Melba VII, who made an official record of 17,364lb. of milk and 869lb. of butterfat. Emblem was also the sire of Kitchener, who, mated to Melba VII, produced the world's record butterfat cow Melba XV, who gave the following yields under official record:—

Starting at		Milk In 365 days. lb.	Butterfat In 365 days. lb.
4 years	..	21,635	954
6 years	..	29,432	1,316
8 years	..	32,522	1,614

Another notable producer was Melba XVII, also by Kitchener, out of Melba VIII, who was a daughter of Melba III. At 6 years, under official test, Melba XVII gave 29,267lb. of milk and 1173lb. of butterfat in 365 days.

Mr. John Fisher

The next importation from Darbalara was in 1912, when Mr. John

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12. Cole, J. T. (1925): "Milking Shorthorn Cattle of Australia;" Proceedings of Scottish Cattle Breeding Conference, page 430.

2a. McCaffrey, Frank (1922): "The History of Illawarra and its Pioneers," page 308.

2b. McCaffrey, Frank (1922): "The History of Illawarra and its Pioneers," page 197.

13. "The New Zealand Journal of Agriculture," volume 7, page 528.

Cherry, one of Mr. J. C. Wright's foundation non-pedigree cows; she was 17 when the photograph was taken.

Fisher, Pukerimu, Cambridge, Waikato, imported 1 bull and 4 heifers. In 1865, following the cessation of hostilities with the Maoris, Mr. Fisher, who was later called to the Legislative Council, received from the Government for his services to his country a grant of 50 acres at Pukerimu. From time to time Mr. Fisher added to his estate by purchases until it included an area of 400 acres of the best land to be found in the Waikato.

For many years the Pukerimu farm was noted for the beef it produced. When dairying began to be taken up in earnest in the Cambridge district Mr. Fisher set out to develop a herd of dairy Shorthorns by the use of Coates' Herd Book bulls. Eventually he graded up his herd to the stage where most of his cows had 4 top crosses of registered Shorthorn sires and were thus eligible for Coates' Herd Book. At that stage he found a ready sale for his young bulls (eligible for Coates' Herd Book) and the reputation of his herd was such that high prices were freely given by dairy farmers.

Mr. Fisher must have been very much impressed by the fame of the milking qualities of the Darbalara stud or he would never have taken the decisive step of using an Illawarra bull on his Coates' Herd Book cows, which automatically debarred the offspring from entry in the New Zealand Shorthorn Herd Book.

As there was at that time no New Zealand Milking Shorthorn Herd Book, the young bulls would have to be sold as unregistered stock and depend for their recommendation on the reputation of the Darbalara stud. Darbalara again gave some of its best blood, for the bull selected for Mr. Fisher, Lily's Prince, was a full brother to Kitchener, afterward sire of the world-record butterfat cow Melba XV.

Mr. Fisher took a prominent part in the formation of the New Zealand Milking Shorthorn Association and was the only Waikato breeder to enter cattle in the first volume of that association's herd book. Though Mr. Fisher did not believe in forcing his best cows to make high records for advertising purposes, his herd was regularly tested. The good average production of his cows and his exceptional success in the show ring resulted in a very good demand and high prices for his surplus stock. The herd was dispersed in 1928, after Mr. Fisher's death.

Mr. J. C. Wright

About the same time that Mr. Fisher imported his Darbalara cattle Mr. J. C. Wright, of Matapu, Taranaki, imported an Australian Illawarra bull. Mr. Wright was then the most prominent Taranaki breeder and exhibitor of Milking Shorthorns. He took a leading part in the formation of the New Zealand Milking Shorthorn Association, was president in 1915, and has been patron of the association since 1922. Declining health forced him to disperse his herd in 1919.

Mr. Wright has contributed the following history of his famous Cornwall Park herd:—

The herd was founded on July 4, 1904, with 50 2-year-old heifers and 12 picked cows selected by myself from herds in Taranaki. I kept all calves and sold the steers, only keeping the best heifers for myself. I purchased a 3-year-old bull from Mr. D. Gebbie. I called this bull Diamond. He was a good type of dairy bull with a good deep body. He served the 72 cows and only left 2 empty. I used him for 5 years. The cows were fine type like the Illawarra cattle. Cherry was one whose photo was taken when 17 years old after having had 15 calves. Other foundation cows were Truthful, Rose, White-back (dam of Honeycombe), Sandy, Eddy, Maude, and Lizzie. All bred well to Diamond. I showed him when 6 years old at Hawera and got first prize for him. He sired Honeycombe (unbeaten in the show ring), Garnet, Pet, and several other good cows. The next sire was Defiance, by Diamond from Record. His dam had a record of 13lb. of butter off the pan. He sired Sweet Garnet, Pet's Charm, Launa, and Model, all fine cows. Sweet Garnet was sold at my sale for 60gns. She went to Christchurch and put up, C.O.R., nearly 17,000lb. milk and 600lb. fat. The next bull used was Baron Cornwall, bred by State Farm, Levin. He was by Royal Cornwall 21st (imp.) out of Sweet Briar, whose farm record was 11,479lb. milk, 454lb. fat. Royal Cornwall 21st (imp.) was bred by Mr. J. T. Hobbs, Gloucester, England. His dam, Chorus 41st, was described by Mr. Hobbs as a fine cow. Her dam, Molly Millicent, was three times Champion at the Royal, England. Baron Cornwall bred well. Daughters of his were Honesty, Little Pet, and Lady Cornwall (out of Honeycombe). Lady Cornwall sold at my sale for 120gns. and later won the championship at Christchurch.

The next bull used was Acorn of Oakdale (imp. from New South Wales). I visited New South Wales in 1912 and attended the Royal Show. I saw his sire Aristocrat of Oakdale win the class for bull and progeny, beating Emblem of Darbalara. Acorn's dam, Alice of Oakdale, won prizes in butterfat tests, giving up to 62lb. milk with 4.3 test. She was champion of all breeds at various shows.

My next importation was two heifers, Joyce 2nd of Hillview and Posey 2nd of Hillview. Mr. Dudgeon only let me have them as a favour. Joyce's first daughter, Joyce 3rd, gave just under 20,000lb. milk and 709lb. fat, C.O.R.

The next bull I used was Clinker 2nd of Oakdale (imp.). He was a fine bull from G. H. Tate, Oakdale, Kangaroo Valley. He was a different breed to Acorn; his dam was Rose of Darbalara. He got fine stock, but I only got his first crop of heifers in milk when I had to disperse my herd.

At the sale 84 head averaged 52 guineas, totalling £4600; of the imported stock Joyce 2nd of Hillview brought 240 guineas, Posey 2nd of Hillview 190, Clinker of Oakdale 200, and Acorn of Oakdale (lame) 75.

Mr. Gordon Salway

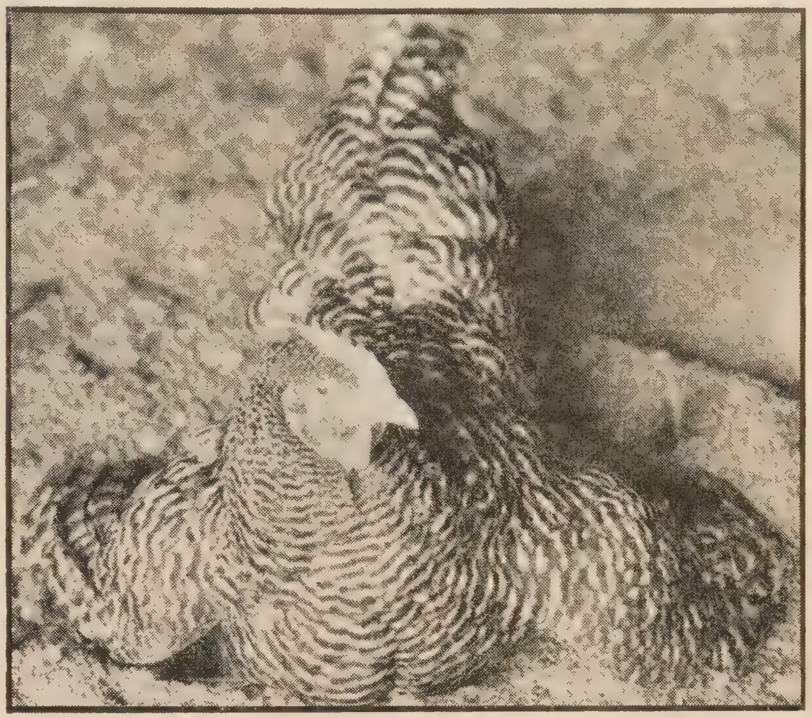
The next importation of Australian Illawarra Shorthorns was made by Mr. Gordon Salway, a young man dairy farming at Bell Block, Taranaki, with a non-pedigree Shorthorn herd. He was very friendly with Mr. J. C. Wright, of Matapu, and Mr. Turnbull, of Sentry Hill. Mr. Wright was a great admirer of the Illawarras and criticised the beefiness and mediocre milking qualities of the dual-purpose pedigree Shorthorn, while Mr. Turnbull pointed the finger of scorn at the smutty noses and bad colours of some of the Australian special-purpose dairy animals and would have nothing to do with them; he was a lover of the Coates' Herd Book Shorthorn. Mr. Salway listened to many an argument between his two friends and eventually, in spite of the bogy of foreign blood, decided to import an Australian Illawarra bull. He corresponded with Mr. Cole, manager of the Darbalara Estate, and eventually arranged to purchase 1 bull and 2 in-calf heifers, which were to be shipped after being exhibited at the Sydney Royal Show. Dainty 7th won the 2-year-old class and her heifer calf, Lady Mary, was born on the showgrounds (April 5, 1914). The other heifer, Camellia 11th, had a bull calf, Camellia Prince, born (July 2, 1914) in quarantine after reaching New Zealand. The yearling bull, Rose Prince, was by Emblem out of Rose of Bolaro.

This was a good start for a young breeder, but Mr. Salway's breeding operations were interrupted by the First World War. He decided to sell his herd and join up. At his sale Mr. Primrose McConnell, of the Dilworth School of Agriculture, Otahuhu, Auckland, purchased Dainty 7th and her calf Lady Mary. Mr. James Parkinson, Opotiki, Bay of Plenty, purchased Camellia 11th and the bull Rose Prince.

Mr. Salway was captured by the Turks and was a prisoner of war for 2½ years. After his return to New Zealand he tried to import some more Australian Illawarra Shorthorns, but found that he could not do so owing to an embargo being placed on the importation of Australian cattle,

The Choice of Breeds for the Household Poultry Keeper

ONE of the first questions asked of a Poultry Instructor by a person intending to start household or sideline poultry keeping almost invariably is: "What is the best breed of fowl?" No question about poultry is more difficult to answer concisely and straightforwardly. No breed can be named without qualification as "best," for the strain within the breed is of greater importance. In this month's article for the household poultry keeper W. L. McIver, Poultry Instructor, Department of Agriculture, Hamilton, recommends the keeping of a breed the appearance and characteristics of which appeal to the owner.



[Fraser Niederer photo.

Broodiness must be expected in all heavy breeds.

THE White Leghorn is the most popular breed in New Zealand and most overseas countries and is hard to beat for annual egg production. White Leghorns do credit to their breed in laying competitions, but do not always top the list, as frequently Australorps, Orpingtons, and Rhode Island Reds gain the honours.

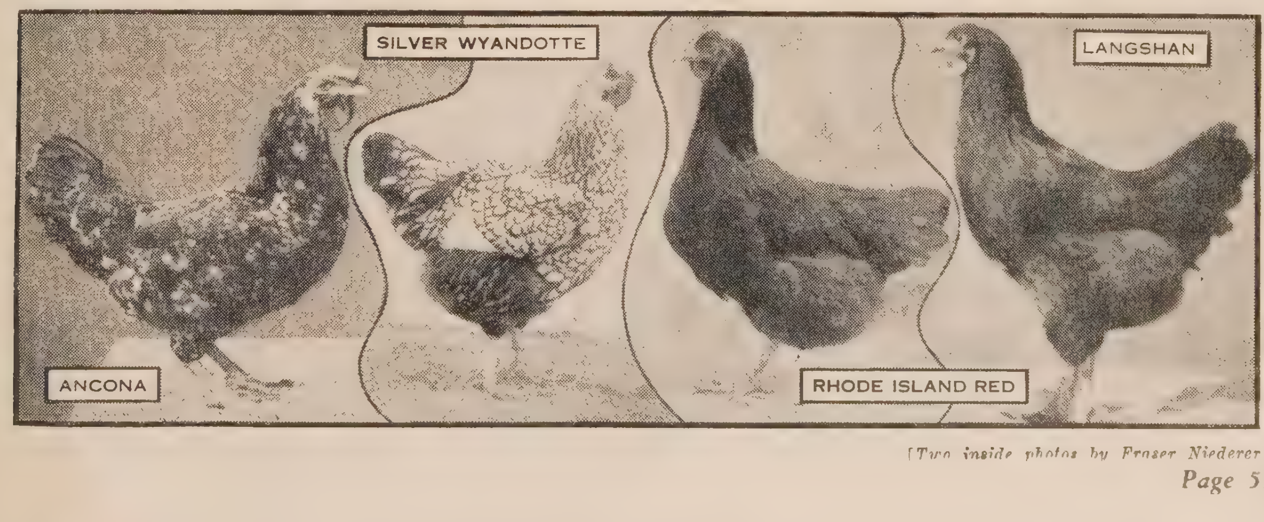
Results of single-bird competitions do not prove that the winner's breed is the best in the country at the time. The bird might well be of an improved strain within the breed, a result of careful study and breeding by the owner, and it could even be an exception within that strain. Reports of egg-laying tests show that to be the true explanation in most cases. A competitor usually makes several entries, and often has one bird high up in the list and another well down. At the time of writing one entrant in the heavy-breed trials has a pullet which has laid 246 eggs and is in fourth place and another which has laid only 87 eggs and is second from bottom on the list.

Even team trials do not necessarily prove that the winning birds belong to the best breed, because stamina and livability are important factors affecting the final results and their influence cannot be separated from laying ability. Certainly team trials are more likely to allow an accurate estimate of the worth of a breed, but the final results do little more than prove that one competitor's team was the best that year; in the following year a different competitor and a different breed could win. In the breeders' trial for teams of 20 pullets at the Poultry Demonstration Plant, Upper Hutt, White Leghorn teams were first and second for total production, followed by an Australorp team and another pen of White Leghorns, but the winners' total of eggs for the year of itself does not prove that they were the most profitable, because egg prices vary during the year. The winning team might lay most of its eggs in spring and summer, but another team might lay more winter eggs of a higher value.

In general, heavy-breed pullets lay more eggs in winter than light-breed pullets and light breeds outlay heavy breeds in spring and summer, but those statements are often contradicted by the efforts of individual birds and strains.

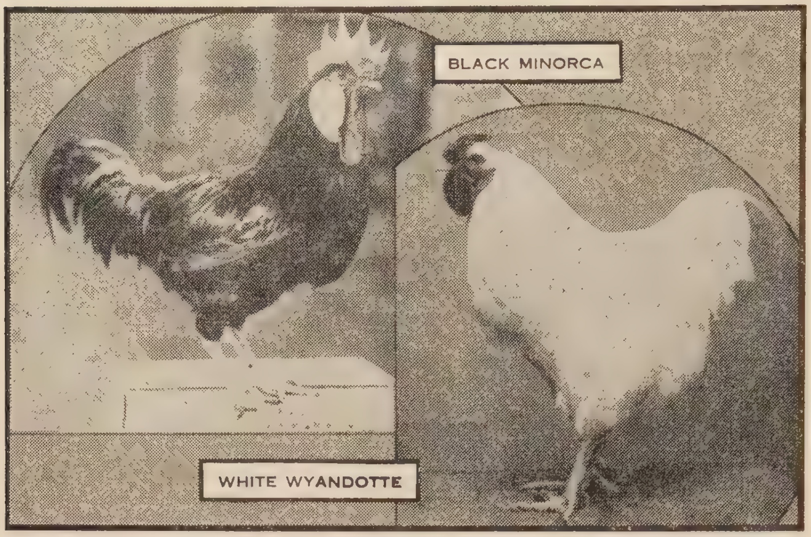
Factors Affecting Choice

The household poultry keeper is not concerned only with profit and loss. Though expense and income should be of prime importance, the backyarder



[Two inside photos by Fraser Niederer

BREEDS FOR HOUSEHOLD POULTRY KEEPING



is more concerned with an adequate supply of eggs, especially during autumn and winter, when eggs are in short supply in shops. Consequently, he need not necessarily feel concern if his Australorps lay 170 eggs each in the year while his neighbour's Leghorns lay 180. His fowls may give him just as much poultry manure, which he values highly for his garden, and he may also take a greater pride in his fowls as birds and not as mere egg producers.

Likes and dislikes also must be considered. One person may not object to broodiness in heavy breeds; another may not want to be bothered with counteracting broodiness. One person may work unhurriedly among light breeds, take a real interest in them, and have them so quiet that they will jump up to his shoulders; another may cause the birds to be so scary that they frequently fly over fencing. Some are concerned only with eggs; others want brighter feathering and prettier appearance.

A householder is more likely to make a success of keeping poultry if he admires the breed he maintains. His likes could well be the dislikes of other members of the family. In many cases the householder cannot attend to all the birds' requirements, and at least the week-day afternoon feed and greenfeed are attended to by the wife and children. Women and children usually prefer quiet behaviour in fowls, and most children like the handsomely feathered breeds.

The fact that most commercial poultry farms run White Leghorns or Orpingtons, with Rhode Island Reds third in favouritism, does not mean that those are the only paying breeds. Black Minorcas and Anconas do not do as well in large flocks, but in small units they have proved excellent layers. For that matter, nearly all fowls give better results if they are run in small units.

The Rhode Island Red is a good and handsome breed. As good and even more handsome are Barred Plymouth Rocks, Light Sussex, and the various colours of Wyandottes. The Langshan is black but is set off by its feather sheen, and the Black Minorca has large white ear lobes. The Brown Leghorn should be more favoured than it is, as the male especially is a lovely bird. Silver Campines, Golden Hamburgs, Buff Orpingtons, Barnefelders, Cambars, and Legbars are all handsome and useful breeds. Poultry keepers not familiar with these and many other breeds could spend an instructive afternoon or evening at a poultry show.

Pride Leads to Success

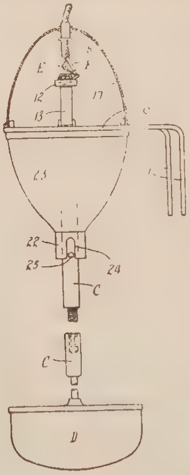
If the breed being kept is not completely to the owner's liking, he should quit it and acquire another which arouses a full sense of pride. The greater the degree of pride in the birds, the greater is the likelihood of success with poultry keeping. The breed should be chosen for appearance, general characteristics, and suitability as a table bird as well as for laying ability. Health, vigour, and livability should be kept in mind and the seller's farm and stock inspected before the birds are bought.

To be able to take visitors to the poultry run to admire birds that are both good layers and attractive is pleasant. If a pride in showing off the fowls to friends does nothing more than cause a voluntary improvement in the standard of cleanliness in the henhouse so that visitors will be all the more impressed, some advantage has been gained. If it goes further and causes the nests, perches, troughs, and equipment to be improved, the fowls are all the more likely to respond by increasing their efforts. If the comparison between the birds and the average type of backyard henhouse impels replacing a dilapidated structure with housing befitting the appearance of the pullets, little more can be expected other than commensurate care in feeding and watering.

Recent Patent Specifications for Farming Inventions

The following particulars of recent patent applications of interest to farmers have been selected from the Patent Office Journal, issued on March 30, 1950, and are published by permission of the Commissioner of Patents, Wellington. Photostat copies of any specifications will be supplied for a small fee on application to the Patent Office.

No.	Description.	Applicant.
96151	Milk-level Indicator for Milk Cans or other Vessels,	R. W. Pressley.



[Only those references which are necessary to an understanding of the specifications are quoted in the abridgment below.]

To indicate clearly the rising of liquids (e.g. milk) within a container when reaching a predetermined level a float-actuated switch mechanism operating a visible or audible indicator by an electric circuit consists in a base plate 10 to be clamped to the top edge of the liquid-receiving vessel, electric switch-forming means 12 interposed in a low voltage circuit E, F, the switch embodying a rod C arranged to slide vertically through the base plate 10. On lowering, rod C opens the switch, while when raised rod C closes the switch. Float D is attached to the lower end of the rod C, pin 25 preventing the latter from turning in guide 22, the whole switch assembly being sealed against penetration of moisture by a dome-shaped cover 17.

No.	Description.	Applicant.
95966	Self-loading Earth Wagon,	R. G. LeTourneau.
96141	Crutching Appliance,	R. T. Wawn.
96209	Drag for Clearing of Watercourses,	G. L. Romley and E. C. Hodgson.
96989	Ear-marking Tool,	Aviation Development Ltd.
97465	Pourer Cap for Milk Bottles,	D. Roberts.
98099	Grassboard for Mowing Machine,	L. D. Chambers.

CONSTRUCTION OF A FARM POND

Selecting and Laying Out a Site and Building a Dam

AS most of New Zealand's farmland is hilly or undulating, many excellent sites exist for the construction of clean-water ponds, which can be located in natural waterways draining uncultivated watersheds, on sloping ground as by-pass or spring-fed ponds, or on flatter areas as dug-out ponds fed by surface flow resulting from a high water-table. As well as being a useful source of water for stock, a pond and watershed may occupy badly eroded or waste areas if the watershed is vegetated properly to prevent soil from washing into the pond. Such ponds can be built by a farmer from soil with his own tractor and implements, and the procedure is described by H. W. T. Eggers, Engineer, Department of Agriculture, Wellington.

JUST as the roof of a building can be used as a catchment area for rain water for tank storage as a domestic supply, surface run-off of rain water can be conserved in surface ponds to supply water for stock; that is, a pond water supply is the large-scale equivalent of a tank supply.

However, a pond has advantages that cannot be obtained with tanks: A pond may use as its catchment area otherwise-useless land; a pond and its watershed may occupy badly eroded or waste areas, provided they are properly vegetated; a water supply can be provided for livestock in pastures distant from any other source of supply; and a pond may also supplement other sources of water for uses such as fire protection, spraying, and irrigation. Stocked with fish, ponds provide food and recreation, and birds and other wild life are attracted by vegetation growing about a pond.

Owner-built ponds can be superior to other structures. Because the dams are built more slowly and the earth is packed better, there is less settling and more thought can be given to important details.

As the building of each pond requires its own detailed investigation, and because he will be carrying out the work himself, the farmer who sets out to build a pond needs some technical assistance to determine the following points:—

The suitability of the soil for holding water.

The drainage area to avoid flooding.

An adequate spillway for the heaviest rain.

The proper dam height above the spillway.

Pond depth to assure a continuous water supply.

Conformance to the laws covering the impounding of water.

Water-holding Ability of Soil

The success or otherwise of the dam depends on the suitability of the soil for holding water. On country through which water drains rapidly a dam would be useless. The greater the extent to which normal losses can be eliminated, the greater will be the quantity of water available for useful purposes.

An examination of the physical properties of the soil gives some indication of its water-holding capabilities. Sandy or gravelly soils drain much more rapidly than clay or soil of very fine granular construction. Accurate tests of the suitability of soil for dam construction can be made only in a laboratory, but anyone familiar with soil characteristics could determine its suitability by physical examination.

The proper functioning of a pond depends not only on the soil from which the dam is built but also on the subsoil below the area covered by the pond. Though the surface soil of the pond site may hold water well, if it is deposited in only a thin layer over a gravel bed, it may not be sufficiently strong to sustain the imposed weight of water, allowing a break-through and subsequent drainage through the gravel bed.

A free-draining stratum in the subsoil of a pond site represents a seepage line which may affect the design of the dam materially. For this reason the structure of the soil strata of the pond site must be investigated and mapped before the dam site is pegged. This can be done by sinking test holes and from the data obtained constructing strata maps as shown in Fig. 1. Holes may be dug with a spade, sunk with a post-hole borer, or cored with a soil sampler. In dug holes the strata penetrated are visible and can be measured; if a post-hole

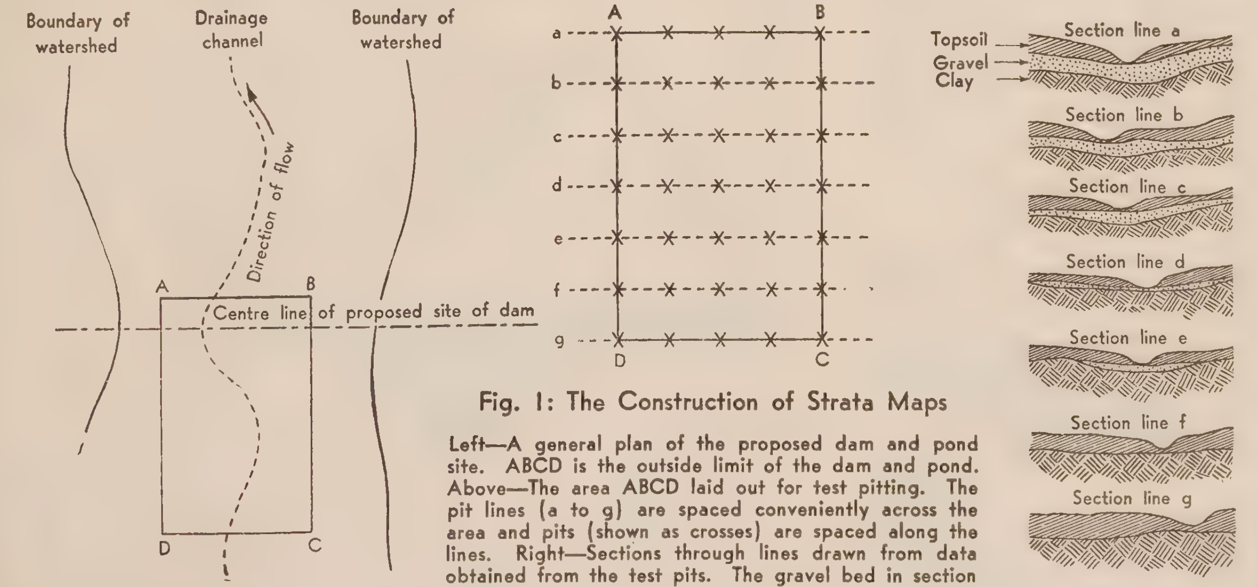


Fig. 1: The Construction of Strata Maps

Left—A general plan of the proposed dam and pond site. ABCD is the outside limit of the dam and pond. Above—The area ABCD laid out for test pitting. The pit lines (a to g) are spaced conveniently across the area and pits (shown as crosses) are spaced along the lines. Right—Sections through lines drawn from data obtained from the test pits. The gravel bed in section line a disappears in section line f, which indicates that the site should be further upstream with its lower boundary above line f—that is, the site must be clear of the gravel bed. With careful relation of depths to a datum level, accurate strata contours could be shown, but that is not essential, as the nature and not the shape of the strata is important.

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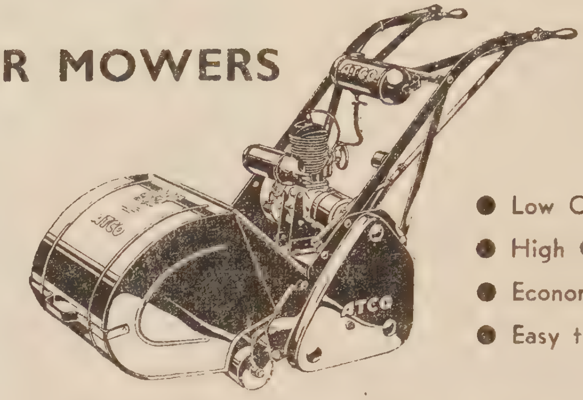

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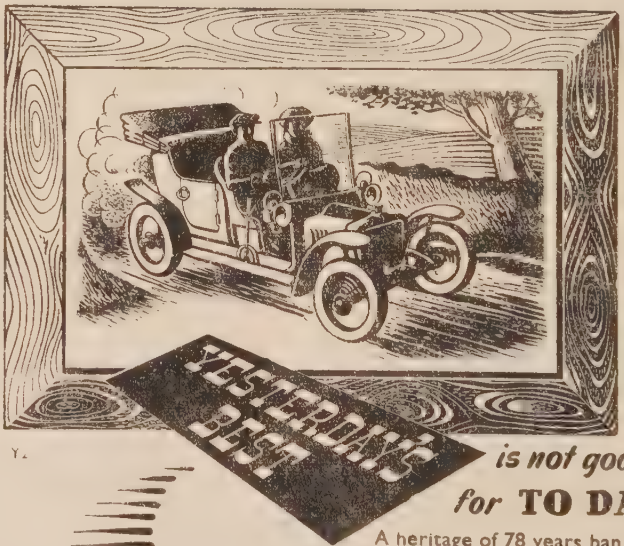

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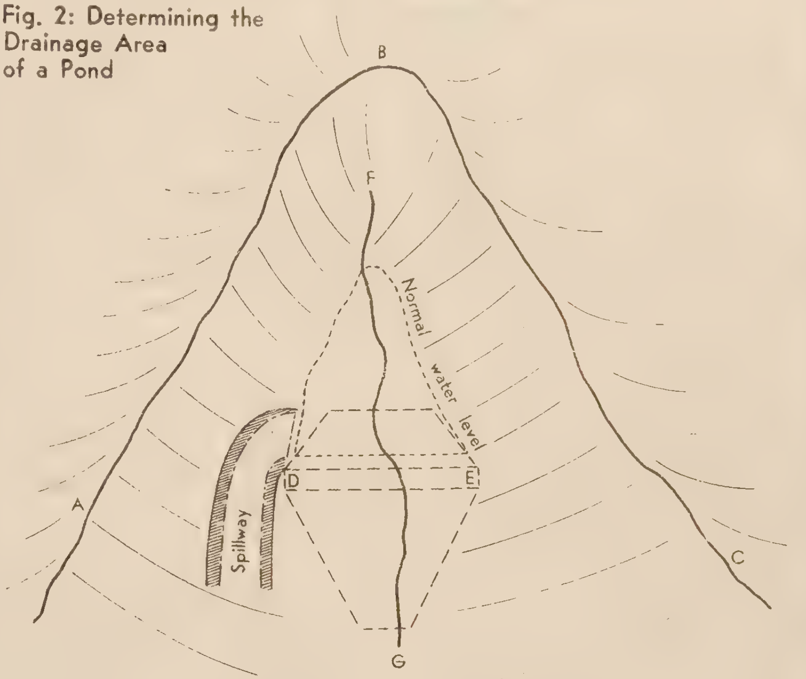
borer is used, depths must be measured as each change of stratum is noticed; the complete sample can be removed from a soil-sampler tube into a trough or launder and measurements taken from the layers exposed.

Fig. 2: Determining the Drainage Area of a Pond



ABC is the boundary of a natural drainage area, DE the crest of a proposed dam, and FG the centre channel.

Drainage Area Required

The drainage area needed to keep the pond filled without excessive flooding is the basis for determination of the location of the pond and must be decided before the dam site is staked out. Rainfall and soil permeability are factors in this calculation, and the method of arriving at a solution is shown in Fig. 2. ABC represents the boundary of a natural drainage area gravitating to the centre channel (FG), which may be a depression, a shallow gully, or a natural waterway. DE represents the crest of a proposed dam. It can be assumed that all rainfall over the area ABC will be partially absorbed by the soil and partially drained off along FG. Soil permeability and the nature and slope of the bedrock below area ABC will determine the amount of water that will flow along FG at any one time. If bedrock is generally near the surface and FG close to bedrock, after the surface soil reaches saturation point practically all precipitation over ABC will be drained off along FG. For example, after a dry summer the first autumn rains probably would be nearly all absorbed by the surface soil and very little would flow into FG; after the surface soil reached saturation point subsequent rains would flow off the surface into FG and seepage to bedrock through the surface soil would also find its way into FG.

The run-off of heavy winter rains causes flooding and must be provided for. Vegetation increases the holding qualities of the soil, and therefore vegetated areas are the most suitable for catchment. As an extreme example, two catchment areas of identical shape and size may be assumed to exist side by side, one bushed and the other bare rock: If 1in. of rain fell in 1 hour over the bushed area, some of the water would be absorbed into the surface soil to find its way to FG over a period and the remainder would constitute immediate run-off into FG; on the bare-rock area the whole of the precipitation would constitute immediate run-off into FG and flooding would therefore be much more severe than on the bushed area.

As flooding is influenced by the vegetation of the area and the nature and depth over bedrock of the surface soil, no rule can be given for judging the possibility or extent of flooding on a site. Each location must be studied on its merits and a decision arrived at after careful observation under wet conditions combined with calculations of total catchment based on area and rainfall. For example, if an area appears suitable for a pond site, before any decision is reached about the size of the pond and the exact location of the dam regular observations of the area should be made during autumn and winter. If the summer has been reasonably dry, the effect of the first prolonged wet spell should be noted. If the extent of flooding after a period of heavy rain is compared with the amount of rain over a given period, a good indication will be obtained of the likely extent of flooding for a given rainfall. Assuming saturated conditions after intermittent rain, if a further fall of 1in. of rain in a week causes flooding, it is safe to consider the flooding as equivalent to the acre-inches of water over the area being drained during 1 week. This is the quantity of water which must be passed over the dam spillway. Any excess flow will cause erosion of the spillway site unless the spillway is properly constructed.

Size of Spillway

If normal flooding is not excessive and the site chosen is otherwise suitable, the spillway capacity can be calculated for any abnormal flooding. Assuming the same conditions as in the previous example, if 1in. of rain in a week does not produce excessive flooding but meteorological records show that the district is subject to rainfalls of 1in. in a day or less, the spillway must be large enough to cope with the flow of the same number of acre-inches of water in 1 day or less.

In practice it is advisable to construct the spillway with a wide margin of capacity to allow for abnormal conditions, as in such circumstances, though erosion might occur at the spillway itself, the dam would be undamaged.

Height of Dam above Spillway

If the spillway is too small and flood water builds up to the crest of the dam, the whole structure is endangered and washover will quickly erode the crest and downstream face. The spillway must be so proportioned as to reduce the depth of flow without decreasing the volume, and at the same time its lip must be sufficiently below the dam crest to obviate the possibility of water backing up to crest level.

Depth of Pond

Pond depth can be decided only by considering demand, evaporation, and seepage losses and allowing for possible feeding by rainfall during the period of maximum demand. The topography of the site also influences the depth.

For example, the demand during a 3-month summer period may be assumed to be 100,000 gallons: Seepage during this period may account for 50 per cent. of the pond's capacity, depending on the nature of the soil and the construction of the dam; evaporation may account for another 10 per cent., depending on the area-to-depth ratio of the pond. If 60 per cent. of the capacity is lost because of normal reasons, the remaining 40 per cent. available for supply must be at least 100,000 gallons. Therefore, the capacity of the pond would require to be 250,000 gallons, less any likely feeding during the period.

With the required storage capacity known, the depth of the pond can be calculated in relation to the site area. If the site is shallow, the area-to-depth ratio will be high. Deep ponds are preferable to shallow ones, as they offer less evaporation area for equal volume. The American "standard" pond is not less than 8ft. deep.

TYPES OF FARM PONDS

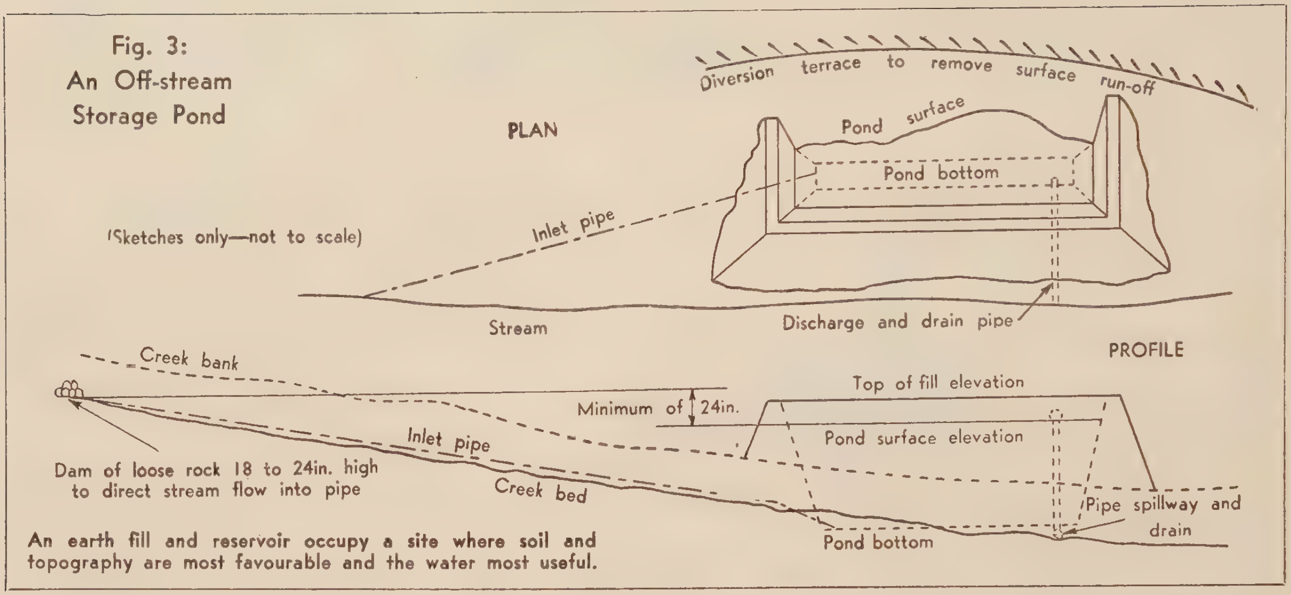


Fig. 3:
An Off-stream
Storage Pond

An earth fill and reservoir occupy a site where soil and topography are most favourable and the water most useful.

Conforming with Laws

The impounding of water is covered by the Land Drainage Act, 1908, and by the Soil Conservation and Rivers Control Act, 1941, Section 155 of which provides that: "No person shall without the consent of the Catchment Board make any drain that empties whether directly or indirectly into any watercourse under the control of any Board or stop or obstruct any such watercourse or erect any defence against water in or near any such watercourse." "Watercourse" under the Act includes every river, stream, passage, and channel on or under the ground, whether natural or not, through which water passes whether continuously or intermittently. "Defence against water" includes any dam, weir, bank, groyne, reservoir, or any other structure or appliance for stopping, diverting, controlling, restricting, or otherwise regulating the flow of water in or out of a watercourse.

Penalties are provided for infringement of the Act, so the local catchment board should be consulted and its permission obtained whenever the construction of a pond in a watercourse is contemplated.

Technical Assistance Essential

Consideration of the points set out shows that there is more to the provision of a successful pond than just piling in earth to form a hollow to retain water. If the labour of building is not to be spent in vain, technical assistance on these six points is essential, and the farmer who has chosen a tentative dam site, recorded waterflow data for at least a year, and prepared strata maps must take his proposals and data to a competent engineer, who would investigate them, advise on the final location and detailed construction of the dam, and carry out the preliminary levelling work necessary before the site is staked out.

A careful study of the pond-building procedure to be described, combined with the technical engineering assistance obtained, should enable the farmer to build a good pond.

Four Types of Pond

Four distinct types of pond can be constructed, each basic structural type presenting its own design problems. The type to fit the site and need for water should be selected, and the engineer consulted would be able to prepare designs for this type of pond from data submitted by the farmer and provided by his own surveys of the site and soils. The four types are surface-water ponds, off-stream storage ponds, spring-fed ponds, and dug-out ponds.

A surface-water pond is so located that all surface run-off from areas above flows through it. One or more spillways are necessary to discharge constant flow as well as flood run-off. This article deals principally with this type of pond, which is illustrated in Fig. 2.

An off-stream storage pond, which may also be termed a by-pass pond, consists of an earth fill and reservoir constructed on a site where soil and topography are most favourable and the water most useful. Usually the reservoir is adjacent to a flowing stream. Water is supplied through an intake structure, which makes the pond adaptable for most uses, as the flow can be regulated. This type is shown in Fig. 3.

A spring-fed pond consists of a reservoir constructed in an area adjacent to and lower than a continuously flowing spring, which is the only source of water for the pond. As a continuously flowing spring will usually maintain water in a pond, it is desirable to eliminate surface run-off by means of diversion terraces. A typical spring-fed pond with surface water diverted is shown in Fig. 4.

A dug-out pond is practical where the slope of the ground is 4 per cent. or less. Subsurface flow resulting from a high water-table is used to supply the pond. This type requires a minimum of design, as no portion depends on a constructed fill to hold water in the reservoir. Such a pond probably could be built by a farmer without the technical assistance required for the other types, as it requires little design and need not conform to any legal requirements, the only essential being a high water-table to ensure a continuous feed.

Principles of Earth-dam Construction

Before the construction of an earth dam as a retainer for pond water can be undertaken successfully, the principles underlying the work must be understood.

To hold water successfully the earth fill comprising the dam must be impermeable. Construction material is very unlikely to be impermeable in itself, but the dam can be made impermeable by including a vertical layer of watertight material in its construction. This is known as a core or cut-off.

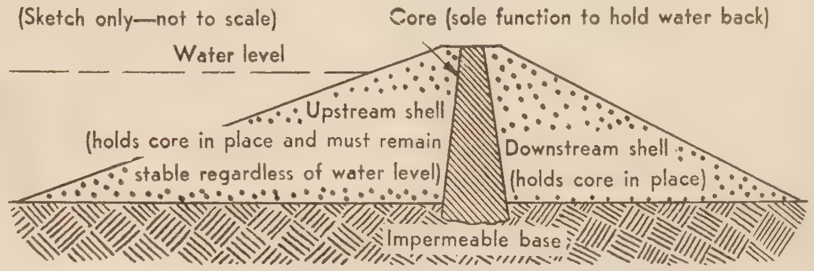
However, a study of the causes of failure of earth dams leads to the conclusion that defects in the foundation are responsible for more failures than any other cause except overtopping. Failures caused by defects in the embankment itself are very rare indeed. Therefore, as the earth fill can be made watertight by proper construction and the foundations can be altered only by a change of location, the foundation should receive fullest investigation.

The foundation for an earth dam should satisfy two independent conditions: First, its hydraulic characteristics should be satisfactory—that is, it should be sufficiently watertight to prevent excessive leakage beneath the dam and it should be safe against failure by piping (water forcing its way through to the stratum below); second, it should have adequate strength to eliminate the possibility of a failure under the weight of the overlying fill or under the pressure of water.

If the foundation material is sand or gravel, or contains layers of these materials, leakage out of the reservoir may be excessive. This fact is commonly recognised, and attempts to cut off the water are often made by constructing more or less impermeable membranes beneath the dam. This is not always an advantage. Many reservoir sites are bounded by permeable deposits through which appreciable leakage can take place when the water level is raised. Even if the dam and its foundation are practically watertight, leakage through an adjacent hillside may make the reservoir useless. Unless the cut-off wall goes far into the abutments, horizontal flow round the ends of an earth dam can also cause leakage. As water can flow readily through even a thin layer of high permeability, failure to cut off one such layer round the end of the dam may be more serious than neglect of the entire flow beneath the embankment itself.

Therefore, in the construction of a pond not only the earth fill comprising the dam but the whole submerged area must be considered, as the container and any soil weakness likely to cause excessive seepage must be located and rectified. There can be no objection to a reasonable seepage loss provided the escape of the water does not weaken the dam.

Fig. 5: A Conventional Dam

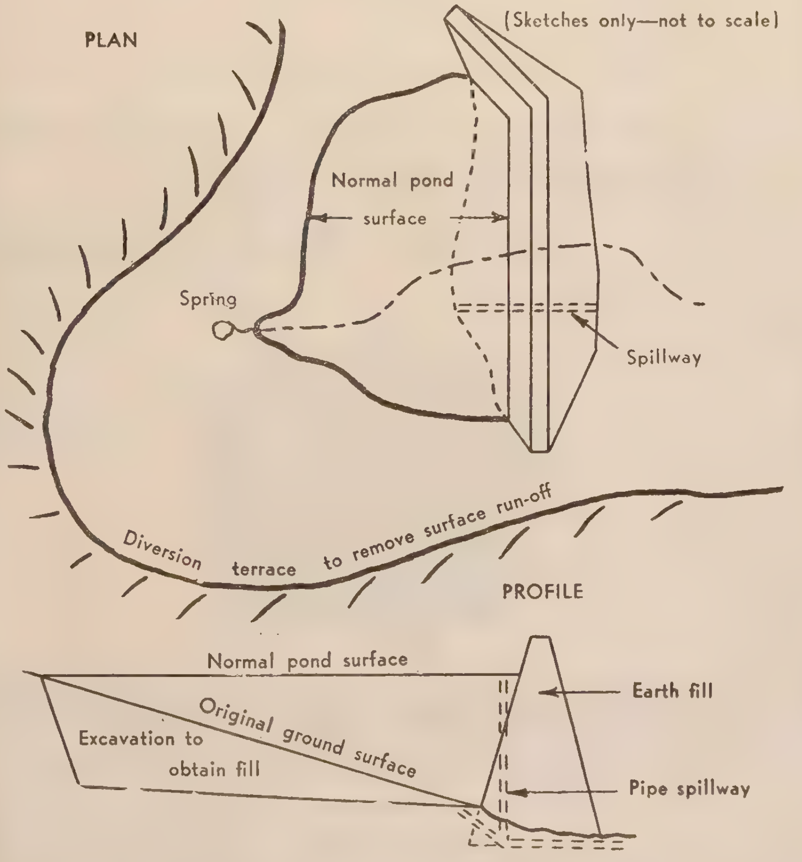

(Sketch only—not to scale)
Core (sole function to hold water back)
Water level
Upstream shell
(holds core in place and must remain
stable regardless of water level)
Downstream shell
(holds core in place)
Impermeable base

Such a dam is ideal if it is built on an impermeable base, preventing seepage loss and uplift.

A section through an ideal conventional dam is given in Fig. 5. It is termed ideal because it is assumed to be built on an impermeable base. The upstream and downstream shells serve solely to hold the impermeable core in place, and the ability of the dam to hold water depends on this core and on the impermeable base.

A variety of methods of ensuring the cut-off of water in dam foundations is possible and the choice depends entirely on subsoil conditions, so expert technical advice is essential if the dam construction is to be a success.

Fig. 4: A Spring-fed Pond


(Sketches only—not to scale)
PLAN
Normal pond
surface
Spring
Spillway
Diversion terrace to remove surface run-off
PROFILE
Normal pond surface
Original ground surface
Excavation to
obtain fill
Earth fill
Pipe spillway

The reservoir is adjacent to and lower than a continuously flowing spring, which is the only source of water for the pond.

Preparation of Site

Assuming a pond site has been chosen and, after observations over a period and soil surveys, technical advice is sought and conditions are generally satisfactory, the advising engineer will require to level the site and stake out the waterline and the base of the dam as in Fig. 6. To enable this work to be done easily the chosen site must be cleared of all vegetation, including bush and stumps; the use of a tractor and chain makes this work fairly easy.

When the line of the proposed normal water level of the pond has been staked the centre line of the dam must be determined and the area of the base of the dam staked out. The area will probably be wider at the centre than at the ends because the lower ground will require greater fill.

Earth for the dam can be taken from the pond area; hence the necessity for staking the pond edge by levelling. After being staked out this edge can be marked by a plough furrow, making possible the location in advance of the position of the spillways and a slow-flow trickle outlet.

As topsoil is the poorest soil for dam construction, the upper layer should be skimmed off the entire pond area and dumped at the outer ends and back of the dam site, as these are areas of low water pressure.

To secure a better bond between the impermeable soil at the base of the dam and the loose earth to be filled in the dam site should be ploughed thoroughly on either side of the centre-line stakes. The "land" in the centre will locate the core trench of the dam, as shown in Fig. 7.

All the top strata must be removed from the core trench, which is excavated to hard, impermeable subsoil

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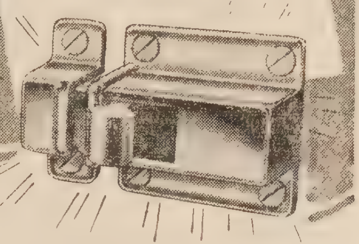

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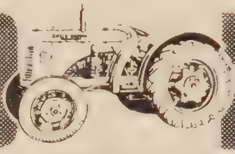
DAVID  **BROWN**

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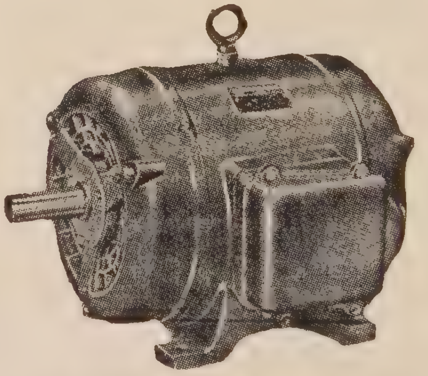

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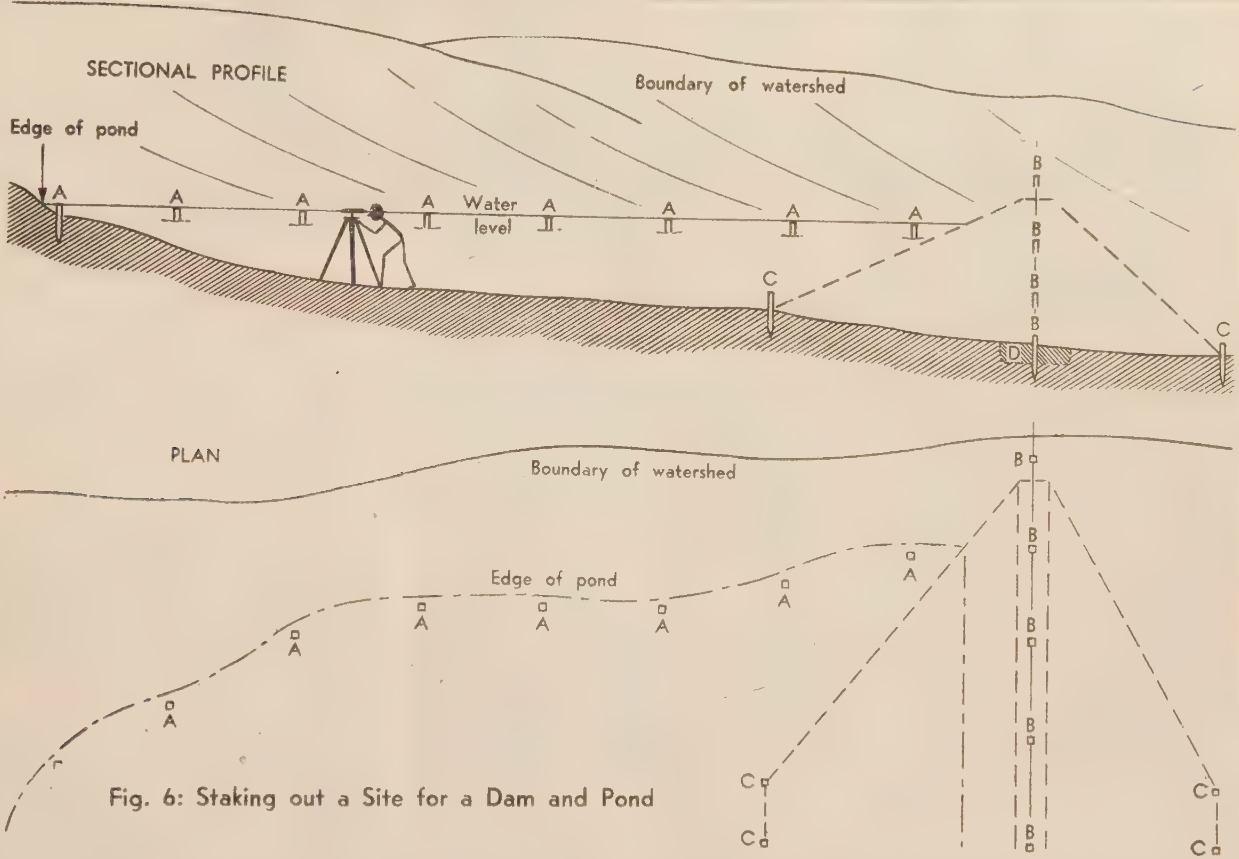


Fig. 6: Staking out a Site for a Dam and Pond

A—Pegs marking the boundary of the pond; they are offset from the boundary because level sights are taken to their tops. B—Pegs marking the centre line of the dam. C—Pegs marking the boundary of the fill. D—Section to be excavated for core.

for its full length, including the lowest point. This ensures a good bond for the core and reduces the possibility of seepage. Most of this work can be done with a tractor and plough, in conjunction with a scraper or dozer blade, though some hand digging may be required at the lowest point.

If the pond is to be used to feed a piped water supply or for irrigation, the outlet pipe must be laid across the dam site at the lowest point, as in Fig. 7. It should be laid after excavation of the core trench has been completed, otherwise it might interfere with excavation, particularly if the work is done by machine. Placing concrete "seep collars" round the pipe reduces the possibility of seepage. The trench to accommodate the pipe, which should be 1½ or 2in. galvanised, is first dug, the pipe laid, and then the seep collars placed.

Seep collars 6in. thick extend 2ft. round the circumference of the pipe. If the earth walls of the pipe trench are notched, boards extended across the trench into the notches on either side provide a simple form for each collar. The pipe must be placed below the frost line and as the trench is filled clay is puddled round the pipe. The tractor wheels passing back and forth give the final packing to the soil in the trench.

The outlet pipe requires a filter on the end inside the dam. This must be provided after the dam formation has been completed, otherwise it will

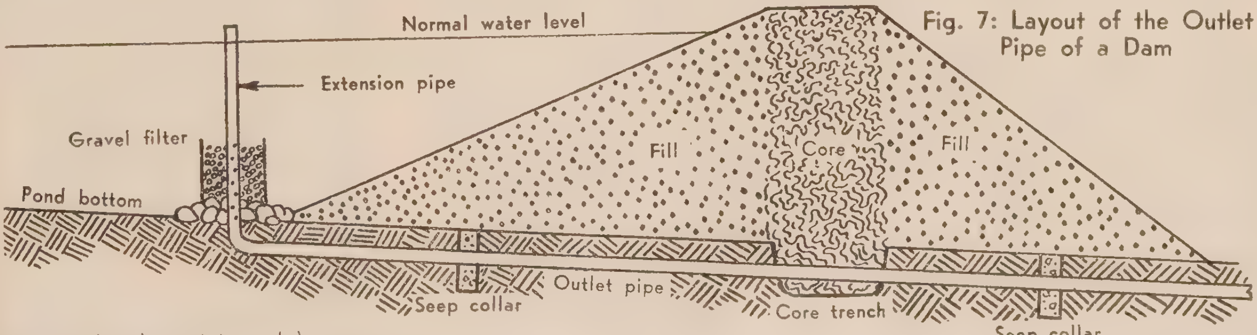


Fig. 7: Layout of the Outlet Pipe of a Dam

(Sketch only—not to scale)

An extension to the discharge pipe reaches above normal water level. About 3ft. of the lower end is drilled with ¼in. holes 2in. apart and a gravel or crushed-rock filter placed around it. The filter material can be held in place by a drum or other container, placed on stones to allow water to enter from beneath, or a concrete box can be built to hold it. The pipe above the water surface not only marks the outlet but also indicates the deepest part of the pond.

BUILDING A DAM FOR A FARM POND

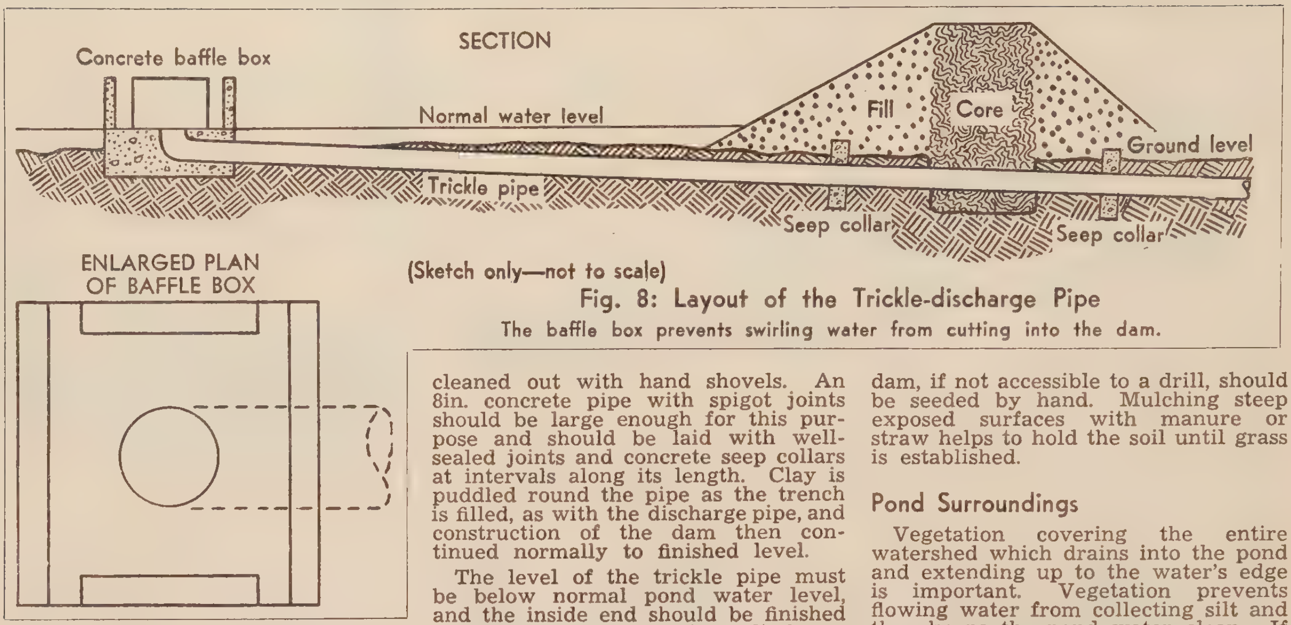


Fig. 8: Layout of the Trickle-discharge Pipe

The baffle box prevents swirling water from cutting into the dam.

interfere with earth-moving operations. In the meantime the end of the pipe should be plugged. Details of the finishing of the inner end of the pipe are shown in Fig. 7.

Building the Dam

With the pond and dam sites prepared, the core trench excavated, and the outlet pipe laid, construction of the dam can be begun.

Work must start at the lowest point with the construction of the core. Moist, impermeable clay is spread in the core trench, starting at the lowest point and extending the entire length. If good clay is not available, puddling of available subsoil in the core trench may be satisfactory. Subsoil is also dumped the full width of the dam, the packing action of the tractor wheels providing consolidation, particular attention being concentrated on the core during the building process. By this means the dam is raised to the finished profile and height, the core being continued to the top and the soil fill graded on either side to profile.

Most of this work can be done with a 1/4 or 1/3 cub. yd. scraper, which is suited to a standard farm tractor. Soil excavated from the pond area can be loosened by ploughing. Because of its speed and manoeuvrability a medium-sized rubber-tyred tractor can move about 20 cub. yds. of earth per hour. If the fill is spread in thin layers the full width of the dam, the soil is kept well packed by the tractor wheels and a dam so constructed will settle very little.

The trickle-discharge pipe must be installed before construction of the dam is completed. Large-capacity grass-covered spillways should carry flood waters only; small amounts of overflow water from light rains or springs are best handled through a trickle-pipe outlet.

The trickle pipe is best placed in the virgin soil of the abutment. The trench can be dug with a plough and cleaned out with hand shovels. An 8in. concrete pipe with spigot joints should be large enough for this purpose and should be laid with well-sealed joints and concrete seep collars at intervals along its length. Clay is puddled round the pipe as the trench is filled, as with the discharge pipe, and construction of the dam then continued normally to finished level.

The level of the trickle pipe must be below normal pond water level, and the inside end should be finished as shown in Fig. 8. The discharge position should be arranged to avoid the possibility of erosion of soil near the dam or abutments by the discharge flow, a good idea being to end it in a stock-watering trough.

Overflow spillways protect dams against flood waters and must always be provided. The bottom level of the spillways should be at least a foot above the trickle-pipe outlet. Spillways should be broad, flat bottomed, and cut into solid ground at the dam ends. They can be constructed with a plough and scraper or dozer blade. Thick grass cover guards against scouring.

The capacity of the spillway should be based on the size of the area which drains into the pond and the heaviest run-off to be expected from the catchment area supplying the pond, and should be decided by the technical adviser consulted.

Spillways should drain into a heavily grassed waterway or drainage area if the dam is on fairly flat country. Normally, they drain into the waterway that has been dammed, which necessitates precautions against scouring near the dam site. The top of a correctly proportioned dam is several feet above the level of the spillway. In some cases where, because of its characteristics, the ground forming the spillway would be liable to excessive scour some form of protection must be provided, such as a timbered spillway with an adequate flume discharge.

In most localities a dam should have a slope not greater than 1 in 3 on the water side and 1 in 2 on the lower side. To maintain this slope and bring the fill up to the proper height level checks must be carried out from time to time by the technical adviser.

With the earth work of dam and spillway construction completed, all disturbed areas near the dam should be smoothed and seeded to local grass crops as soon as possible. Steep banks, including the downstream face of the dam, if not accessible to a drill, should be seeded by hand. Mulching steep exposed surfaces with manure or straw helps to hold the soil until grass is established.

Pond Surroundings

Vegetation covering the entire watershed which drains into the pond and extending up to the water's edge is important. Vegetation prevents flowing water from collecting silt and thus keeps the pond water clean. If clean water flows into a pond, it will not fill up with silt and will retain its original water capacity for many years.

The entire watershed should be protected against erosion to stop soil from being washed into the pond. Livestock must always be fenced well away from the pond and dam site to ensure that the water in the pond remains clean and clear and to prevent damage to the dam and pond banks.

The mixture of grasses most suitable for vegetating watershed areas varies with the locality. Consultation with the local Instructor in Agriculture would settle this point.

Water fowl and other forms of wild life can be encouraged to settle about the pond by planting trees, berry bushes, and certain tall grasses nearby. Trees or bushes must not be planted on or near the dam, as their roots may weaken the structure.

If it is desired to stock the pond with fish, for either sport or food, information about the fish to use, fertilising the pond, and the proper balance of herbiferous and carnivorous fish should be obtained from the Fishery Research Laboratory of the Marine Department, as certain regulations deal with the stocking of ponds with fish.

Though farm ponds can be built using the standard farm tractor for power, to build a pond without technical advice and assistance is equivalent to buying a new bucket with a hole in it—neither will hold water.

Acknowledgments

"Build a Pond," J. I. Case Co. bulletin.

"Agricultural Engineering" (U.S.A.), November, 1947.

"Essential Requirements and Basic Structural Types of Farm Ponds," by Robert S. Calkins.

"Thoughts on Pond Development," by Austin W. Zingg.

Sharpening and Maintaining Beekeeping Hand Tools

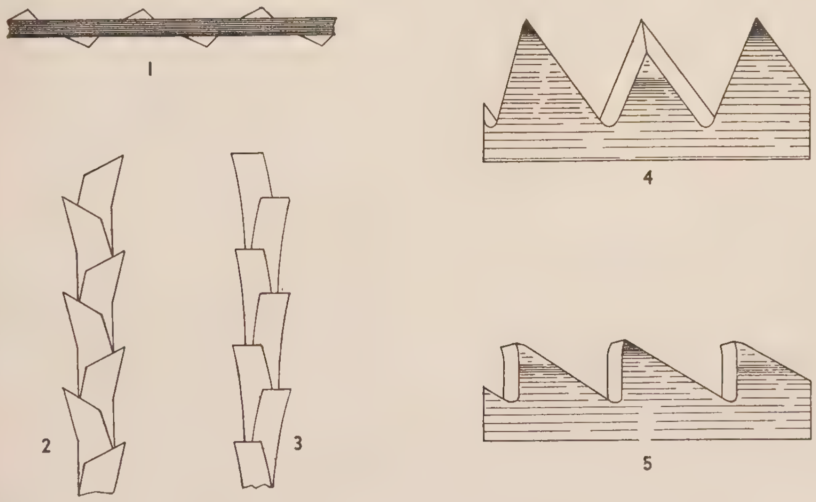
By L. H. JOHNSON, Apiary Instructor, Department of Agriculture, Palmerston North.

ALMOST every commercial beekeeper has a workshop equipped with an assortment of tools for wood and metal work. Prominent among these are the cutting tools, which require to be constantly kept in working order. It is often said that a good tradesman is known by his tools, because their good condition is reflected in the quality of his work. All cutting tools should have a razor-like cutting edge, and it requires a knowledge of certain principles and a measure of skill to effect and maintain the required sharpness.

[W. T. Bray photo.

WITH constant use and style of sharpening, tools assume an individuality peculiar to their owner. Only with an instrument with a familiar feel and balance in his hand can the artisan perform with that unfaltering certainty during those moments when the subconscious mind assumes control of the actions.

The thoughts and impulses of an intelligent mind become manifest in the material being fashioned through the type of tool held in the hand. When the tool functions perfectly there is harmony between the endeavour of the mind and the performance of the hand. In addition, sharp cutting tools correctly set not only minimise effort but introduce an element of pleasure to arduous work. As a step to this attainment only the ordinary and necessary maintenance of tools which the average man is capable of learning and practising with some degree of success is treated in this article.



Sections of saw teeth. Fig. 1—Set on teeth as seen from the back of the saw. Fig. 2—End view of crosscut saw teeth. Fig. 3—End view of rip saw teeth. Fig. 4—Side view of crosscut saw teeth. Fig. 5—Side view of rip saw teeth.

Hand Saws

The origin of the hand saw is obscure, but it is still an indispensable tool in any up-to-date workshop however much wood-working machinery may be installed. Saws that are straight, properly set, sharp, and shiny work perfectly. The feel and the sound harmonise. The two kinds of hand saws generally used are the crosscut and the rip. Figs. 1 to 5 show sections of saw teeth. Crosscut teeth have the front edges at an angle of 15 degrees and the back edge at 45 degrees. This causes the saw to bite into the wood on the forward stroke.

Jointing a Saw

As saws are often subjected to much abuse and get buckled, it is necessary before beginning to joint a saw to sight the saw along the teeth. If the blade is bent, it can be straightened by bending the saw in the opposite direction to the bow and repeating this until it sights straight.

To hold the saw firmly place it in a saw clamp with about 2in. of the teeth edge projecting above. Lay a mill file squarely on top of the teeth near the handle and run it to the point of the saw, repeating this until the tips of all teeth have been touched or evened up and at the same time taking care to maintain the line of teeth with a slight camber. Uneven teeth will cause the saw to jump when in use.

SHARPENING BEEKEEPING HAND TOOLS . . .

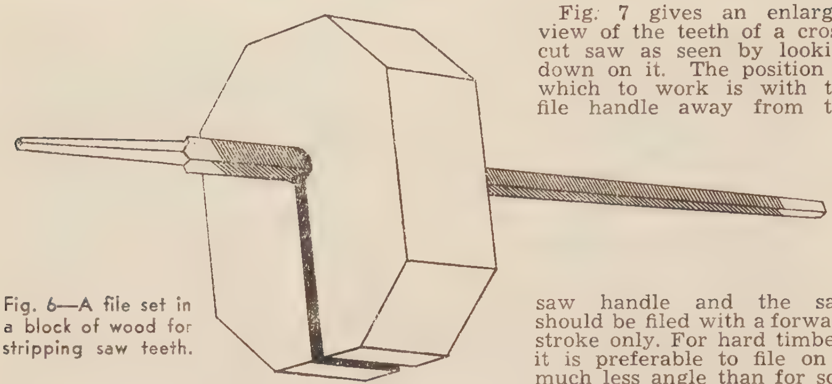


Fig. 6—A file set in a block of wood for stripping saw teeth.

A handy device for this purpose and one that will ensure the same height of teeth on either side may be made from a piece of timber 3in. long, 1¾in. wide, and ⅞in. thick. Make a fine saw cut 2in. long down the centre and bore a ¼in. hole at the end of the cut. A file of a suitable size should be driven through this hole, care being taken to fix it with the lower face square with the cut (see Fig. 6). Do not strip off more metal from the saw than is necessary, as it only wastes the saw.

Setting the Teeth

Figs. 1, 2, and 3 show what is meant by set. The tips of the teeth are sprung over alternately to the right and left. Green, woolly-grained timber requires more set than dry, free-grained wood. In nearly every case the minimum of set that will give the saw clearance should be given.

There are many ways of setting the teeth, but perhaps the best is the use of a saw set, as it ensures evenness. The appliance should be adjusted to set the teeth near to the top.

Filing the Teeth

Crosscut saw: Saw teeth vary in size, but two saws, one with 7 points to the inch and the other with 10 points, are the most commonly used. A 6in. file will fit the 7-points saw and a 5in. the 10-points. The bottoms of the gullets should project about ⅛in. above the clamp.

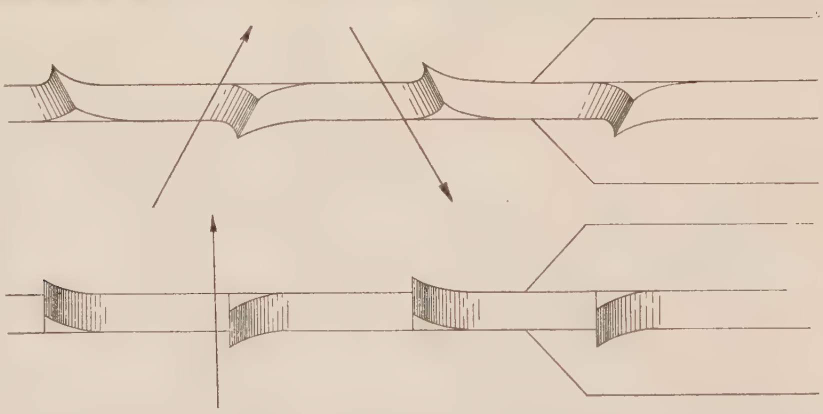


Fig. 7 (upper)—Plan of crosscut saw, showing angle of file. Fig. 8 (lower)—Plan of rip saw, showing set of teeth and direction of file.

Fig. 7 gives an enlarged view of the teeth of a crosscut saw as seen by looking down on it. The position in which to work is with the file handle away from the saw handle and the saw should be filed with a forward stroke only. For hard timbers it is preferable to file on a much less angle than for soft woods. The best position to set up the saw clamp is either before a window or in a doorway with the light in front only. The clamp can then be adjusted at an angle where the stripped surfaces on the tips of the teeth will shine. Pass the file through every alternate gullet, working from one side and taking care to watch the points of the teeth. The clamp should be reversed to file the other side, which is now the finishing side. Care must be taken, as both teeth on each side of the file are to be completed at the same time.

A careful stroke or strokes of the file will cut the teeth until the shine on the tip disappears; it is then sharp. More filing than this will shorten one of the teeth and cause unevenness. Where there are large and small teeth a sideways pressure should be kept on the file to move the centre of the gullets over to diminish the larger teeth.

Rip saw: The methods applicable to the crosscut saw for jointing and setting also apply to rip saws. As the saw is used for cutting with the grain, each tooth cuts like a chisel. The front edges of the teeth are at right angles to the points and the back of the teeth at 60 degrees. The large teeth commence at one end and diminish toward the point of the saw. The file (a 7in.) is run slightly inclined but at right angles to the saw (Fig. 8). Some practice is necessary to maintain the grip of the file at the correct angle and so get consistently even work.

All saws should be rubbed over with an oily rag, as this will act as a lubricant to ease side friction when sawing and will prevent rust. Good-quality saws retain their cutting edges much longer than second-grade ones. Care should always be taken to see that no piece of metal rubs over the teeth. Timber should be cleaned of any sand and a special watch kept for hidden nails, as this care will save much filing. Files are expensive, but will last longer if brushed with a wire brush to remove any filings and kept wrapped in paper when not in use to prevent rusting.

Plane Irons

Planes are used for smoothing or dressing timber. Unless the blade is sharp and the plane correctly set, good work is almost impossible. Although there are a large number of these tools, each for a special purpose, the grinding and honing of the irons are similar. The planes in general use are the smoothing and jack planes and try planes, which have much heavier irons than other designs. After removing the iron from the plane take off the back iron and proceed to grind the blade on a grindstone. It is important to maintain the bevel at the correct angle of 25 degrees. An emery grinder may also be used, but to prevent overheating it is advisable to cover the straight side of the iron near the cutting edge with some grease and when it begins to melt dip the blade in cold water.

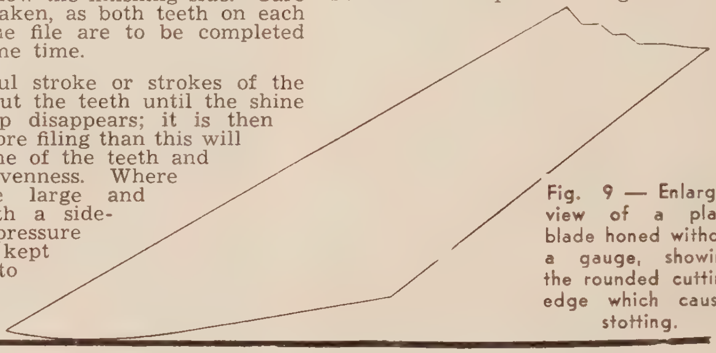


Fig. 9 — Enlarged view of a plane blade honed without a gauge, showing the rounded cutting edge which causes stotting.

The final sharpening of the blade should be done by rubbing the iron back and forth on a fine oilstone, a fairly thin oil being used. The correct angle for this sharpening is 30 degrees. It is also important that the iron be held rigid, as any rocking will not give a true flat surface but will tend to make it rounded as shown in Fig. 9. An iron so sharpened will only stot or chatter.

A blade is rarely sharpened perfectly even by men in the trade. A simple but excellent device (Fig. 10) made by plane manufacturers is a splendid aid for honing. It consists of a small block of metal with a wheel at one end and a stem tapped to take a nut at the other. This fits into the slot in the plane iron. The wing is swung forward until the mark 30 degrees is level with the cutting edge; the nut is then tightened and the wing turned back out of the way for honing. To get a full stroke on the oilstone the wooden block which holds it should be made half as long again and at the ends be level with the cutting surface. With this little appliance an amateur can get a perfect cutting edge. Keep the cutting edge square across, with the corners slightly ground off.

A plane in first-class trim will "talk" and with it a shaving like tissue paper can be removed for the full length of a board. The sole of wooden planes will wear in time and appear to be high just behind the cutting edge of the iron. To rectify this remove the iron, place the plane in a vice, and dress it off with an iron plane. The blades of iron planes are sharpened in the same way as those of wooden planes.

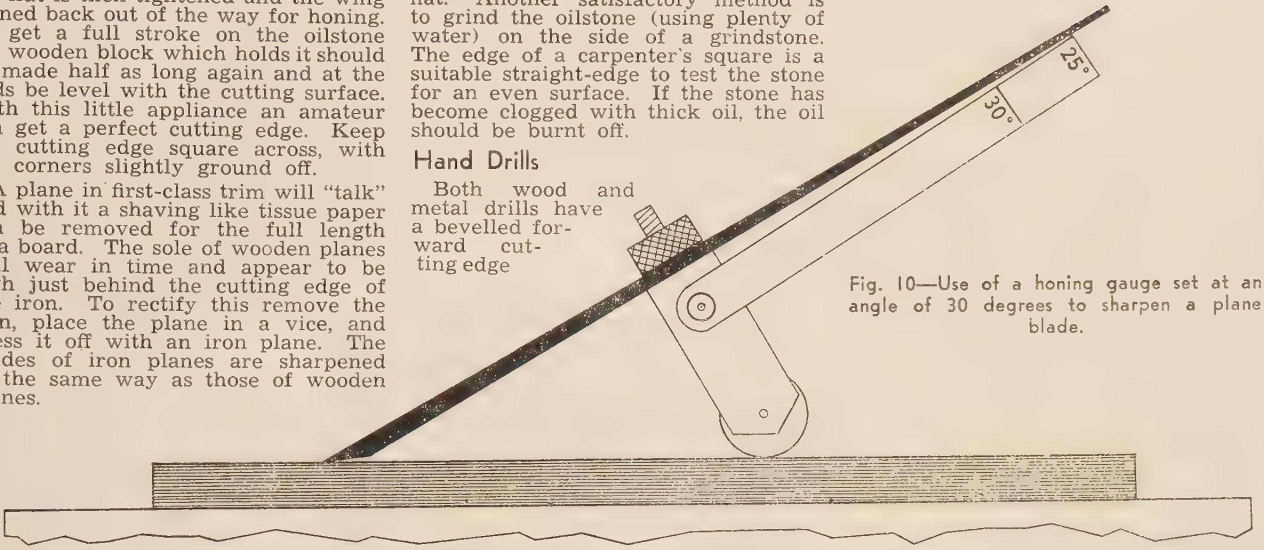


Fig. 10—Use of a honing gauge set at an angle of 30 degrees to sharpen a plane blade.

To avoid unnecessary grinding and honing every care should be taken to protect the very delicate cutting edge. Any sand should be brushed off timber before dressing and a watch always kept for nails or any other hard obstruction. Develop the habit of always laying a plane down on its side away from other tools and when the plane is not in use withdraw the iron a little. Wooden planes feel more lively than iron-soled ones, but a little beef fat or candle grease applied to the sole will overcome considerable friction.

The same principles of grinding and honing also apply to chisels or honey knives; that is, the honed face must be perfectly flat without any visible indication of a shoulder.

Truing up an Oilstone

Oilstones are sawn from natural rock or made of a composition of a very fine abrasive, usually silica. With the constant honing of tools of narrow width the oilstone tends to wear hollow and in this condition is not suitable for finishing a plane iron.

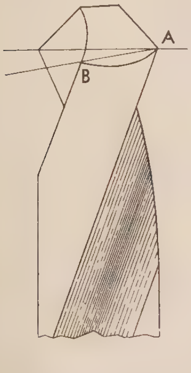


Fig. 11 — Metal-cutting drill. A—Forward cutting edge. B—Heel which must be below A.

One of the best methods of remedying this is to use a piece of glass of 21oz. or heavier measuring 10in. x 4in. and a piece of scythe stone. Pulverise the scythe stone with a hammer and place about a spoonful of this abrasive powder on the glass, which should be placed on a table or bench. Add a little water, and rub the face of the oilstone on it back and forth until the surface is ground flat. Another satisfactory method is to grind the oilstone (using plenty of water) on the side of a grindstone. The edge of a carpenter's square is a suitable straight-edge to test the stone for an even surface. If the stone has become clogged with thick oil, the oil should be burnt off.

Hand Drills

Both wood and metal drills have a bevelled forward cutting edge and are similar, except that wood drills are more pointed. The small drills used with a spiral push drill may be trimmed up and kept in order with a flat file. Metal drills are necessarily very hard and a small emery wheel will be the most suitable grinder. Drills are not difficult to sharpen, provided care is taken not to grind off too much.

Fig. 11 shows an enlarged view of a drill. The point B should always be ground lower than at A. Failure to do this when grinding may cause the face of the drill to be shaped slightly high at the heel (B). This is what causes the drill to overheat and results in greater pressure having to be used than should be necessary.

Tinmen's Snips

Tinmen's snips are used by almost every beekeeper, as they are necessary for cutting sheet metal or wire gauze and are also useful to cut tarred roofing material for hive roofs. Unless the shearing edges are really sharp the tool will not work satisfactorily. As the snips are made of steel, an emery wheel is a suitable grinder. Each blade should be ground at right angles (see Fig. 12), care being taken to keep up a sideways movement across the emery wheel and so grind evenly. The cutting edge, which is the corner between the inside face and the ground edge, should not be visible when sharp. An oilstone should be used on the ground edge to obtain a perfectly smooth corner or cutting edge. Hedge clippers may be sharpened in the same manner.

A honey knife works best with a serrated edge like a scythe and is sharpened with a scythe stone or a mill file. The final test for sharpness is not to feel the edge but to look at it in a good light. It should be invisible, only the faces on each side being seen.

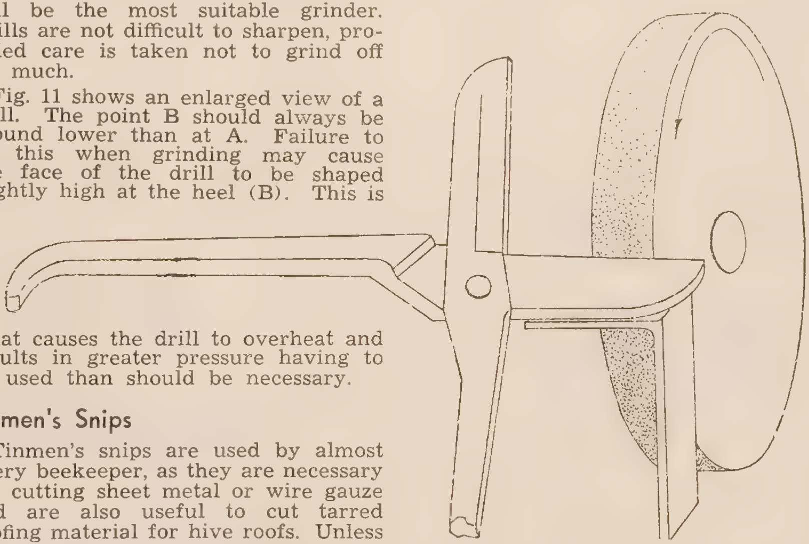


Fig. 12—Grinding a pair of snips by a right and left movement on a carborundum grinder. Each blade should be ground at right angles.

Summary

Saws require sharp points, which can be made with a file. The smaller the teeth on the saw the finer is the cut on the file used.

Plane irons and chisels require a very smooth edge, a finish obtained by using an oilstone of very fine grain. A good edge cannot be obtained on poor-quality steel.

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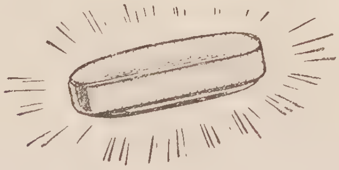

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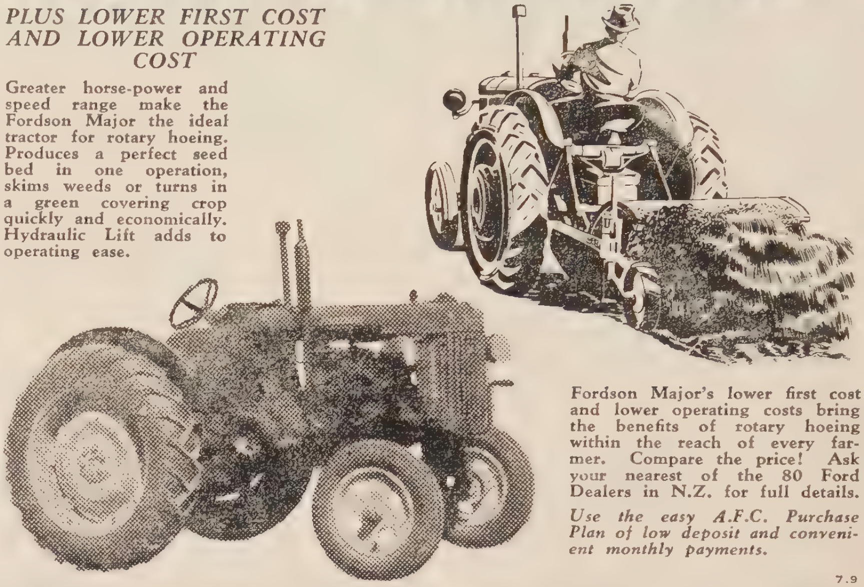

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SEASONAL NOTES Contributed by the EXTENSION DIVISION

WINTER supplementary feeding should begin while pastures are still growing, and the quantities fed should conform to the appetite of the livestock. In the arable districts of the South Island since the introduction of the pick-up baler lucerne hay is being used more widely for the winter feeding of ewes in the place of roots.

* * *

LUCERNE HAY FOR EWES

If feeding out is begun early (from mid-May onward) with small quantities of hay and the quantities are gradually increased, ewes become accustomed to the fodder while grazing is still available. Feeding out should be a daily operation, as fresh lucerne hay is always more palatable than stale hay and there is less waste. A good practice is to feed out as much hay as the flock will consume in one day without wasting any. The usual amount in Canterbury is about 1½lb. per ewe per day for the main winter period, or a total of at least 30 tons for 500 ewes for 100 days' winter feeding.

* * *

FEEDING OUT HAY FOR EWES

Experience shows that it is best to feed out hay in racks (preferably of the portable type) or by spreading it evenly and not too thickly in swaths on the driest fields. Different paddocks should be used for feeding out each day to avoid undue poaching of the land by excessive stock concentration on one area. Ewes during the last 6 weeks of pregnancy should have their hay ration supplemented by "on-and-off" grazing of greenfeed, reserved pasture, or roots to avoid lambing troubles due to a check in condition.

* * *

ROOTS FOR WINTER FEEDING

Turnips and swedes are important crops for supplementary feeding of sheep and cattle in the South Island, about 250,000 acres being grown each year. Feeding with roots extends over a fairly long period; it may be begun in March and may extend until September, according to the weather and the district. By growing turnips and swedes and using appropriate varieties of each a succession of feed will be available from late autumn until early spring. All roots should be fed off in breaks and young stock given the first feeding of each break. It is usual to provide stock with a pasture run-off and some hay when roots are being fed.

* * *

SPRING-SOWN CEREALS

Preparation of land for spring-sown oats and barley should be carried out as soon as soil conditions are suitable and the prior crop can be cleared off. Barley is grown for greenfeed, malting, and stock feeding. For malting, the maltster requires barley of a suitable variety, high germination, and good quality.

* * *

MALTING BARLEY VARIETIES

The standard malting varieties of barley suitable for spring sowing are Golden Archer, Plumage Archer, Spratt Archer, and Kinver Chevallier. Research is the most widely grown variety today, but because of unevenness in ripening, it is not highly regarded as a malting variety. Its yielding ability makes it very popular with farmers, however, and selection work is in progress to obtain a more evenly maturing type of this variety. Another variety commonly grown in the Marlborough district as Pryor or as Marlborough Chevallier (quite distinct from Kinver Chevallier) is of inferior malting quality and could with advantage be replaced with one of the better malting varieties.

[*E. A. Phillips photo.*

Lucerne hay is the main winter feed in Central Otago.

* * *

CONTRACT PEA CROPS

Because of the importance of the export trade to the pea-growing industry, there has developed between merchants and farmers a system of contract growing which gives considerable protection to farmers against fluctuations in overseas requirements. During the war there was a considerable increase in exports of peas, but at present the pea market (for all types) is weak and for that reason a contract affords protection against loss.

* * *

GARDEN PEAS

Almost half the annual pea acreage is of garden varieties grown to supply seed. The main varieties are Onward, William Massey (Kelvedon Wonder)., and Greenfeast (Lincoln), though small quantities of many other varieties are also grown. A considerable proportion of the area is sown with seed stocks originating from British firms; the crops are grown on contract and the produce returned to the contracting firm.

* * *

BLUE AND MAPLE PEAS

Blue peas occupy about a fifth of the area sown in peas annually. The produce is the blue boiling pea which requires soaking before cooking. Prussian Blue is the common variety grown and there is only a very small area of two or three other varieties. Mammoth Blue is a locally bred variety, the peas being larger and of better boiling quality than Prussian Blue. The variety has not become popular, apparently because of the deterioration in quality which may occur through weathering in an adverse season. Maple peas account for about a third of the total annual pea area, Partridge being the common variety grown. Some of the crop is processed locally into split peas for soup making.

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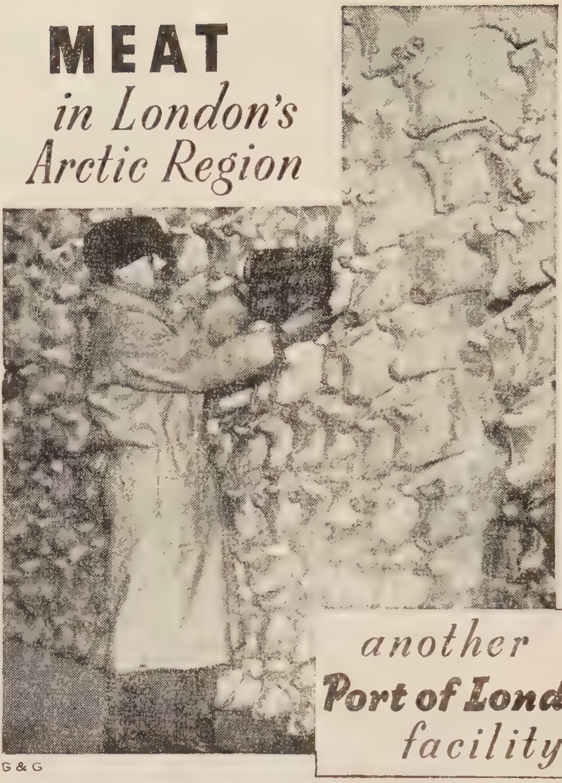

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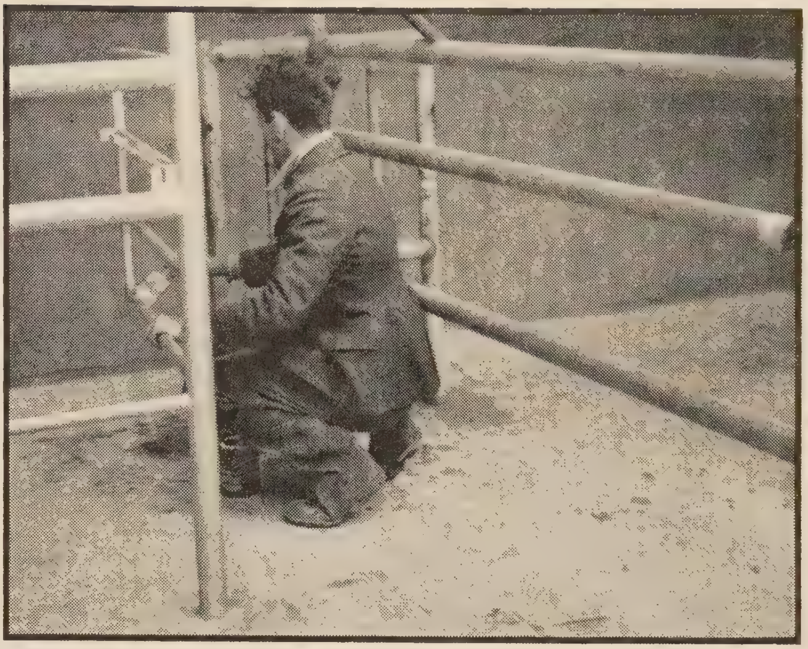
Off-season Work about the Farm Dairy

By J. COOKE, Farm Dairy
Instructor, Department of
Agriculture, Leeston.

THE cleanliness of dairy premises and equipment depends largely on the provision of convenient facilities and keeping them in good repair; correct milking depends on the good order and adjustment of the milking machine and equipment. Regular checking and attention during each "off season" are necessary to maintain efficiency on the dairy farm.



THE off season affords an opportunity to give some attention to numerous jobs around the farm dairy which may have been brought to notice. Minor repairs or renovations may be needed, the laying of a concrete yard or concrete approaches to the shed may be necessary, or a substantial reconstruction of the milking premises to remove existing insanitary conditions may have to be planned. The milking plant itself perhaps may not be operating satisfactorily, with consequent delays during the busy part of the season. A general overhaul of the whole of the milking premises and equipment during winter undoubtedly will save time during the flush of the season.

Unfortunately there often seems to be a tendency to avoid tackling repairs until the last 2 or 3 weeks before the cows come in. Consequently the work has to be rushed and cannot be completed satisfactorily, especially where concreting has to be done (and in the bulk of improvements necessary around some farm dairies a considerable amount of concrete has to be used), as it requires time to set and harden before being brought into use.

Early Attention Essential

It is suggested that when a farmer has decided what urgent work he intends to do during the off season it should be started as soon as the cows are dried off. If a dairy farmer proposes to undertake the work himself—and the difficulty of getting suitable labour to do the work is recognised—and does not feel competent to begin without some advice and assistance, he should contact the Farm Dairy Instructor for the district, who will give advice and, if necessary, supervise the work. (In general, dairy farmers do not take full advantage of this branch of the farm dairy instruction service.) The type of work is not beyond the ability of a handy man if he gets some technical assistance.

Though the winter months give ample time to effect improvements around the farm dairy before the new season opens, it seems that full advantage is not always taken of the off-season period to carry out maintenance work, which should be done not only in the interests of cleanliness, but because from a long-term viewpoint it is essential to keep buildings in good repair. The rapid deterioration of many farm buildings is due to lack of attention from year to year. Delays to repairs are most serious when they relate to the milking shed or farm dairy, because continued neglect may result in the premises becoming dilapidated and insanitary.

The reason for Farm Dairy Instructors recommending that alterations or renovations be made is that they consider the improvements will assist producers to maintain a standard of cleanliness conveniently by having modern facilities. It is not the policy of the Dairy Division, in view of the shortage of building materials, to insist on extensive rebuilding, and the erection of a new milking shed is suggested only when the building in use has reached a stage when it becomes unsuitable for its purpose; a shed is not condemned unless it is considered to have become so insanitary that the quality of milk or cream produced in it could be seriously affected. The Division insists, however, that premises should be maintained in a satisfactory condition of cleanliness. To achieve that one essential is that they be kept in good order by regular maintenance. There are many farmers who realise the value of regular maintenance, and the success of their farming activities is reflected in the good condition of their buildings and equipment.

Improving Surroundings

Probably one of the greatest weaknesses in milking-shed sanitation is the unsatisfactory condition of the surroundings. Unsatisfactory surroundings pollute the air supply to the milking premises and create conditions detrimental to the production of high-quality milk or cream, as milk or cream, either in the shed or near it, absorbs bad odours readily.

It is suggested that any off-season work on the farm dairy should include some attention to improving surroundings and providing fenced and concreted races along the approaches to and exits from the shed. Any cracks or breaks in the concrete floors, etc., must be repaired to prevent further deterioration, because shed washings leaking under the concrete become a source of contamination and will, eventually, undermine the foundations. If the concrete floors are badly broken, they should be broken up and relaid, as this is the cheapest and most satisfactory method in the long run.

A milking shed may be old but reasonably sound except, as is often the case, that bottom plates and timbers close to the floor are rotten. It is not difficult or expensive to reconstruct and modernise such sheds by cutting off the studs and putting concrete dwarf walls under the existing walls. The inside too can be modernised very effectively, but it is recommended that, whatever work is undertaken inside the shed, dressed timber be used for dummies, division rails, partitions, gates, or any internal woodwork, because dressed timber is much easier to clean than undressed.

If a major alteration to or reconstruction of a building is contemplated, a farmer should consult his local Farm Dairy Instructor, who will offer suggestions on up-to-date layout and, if required, provide a sketch plan of proposed alterations. The repairing of minor defects, such as damaged doors and door hinges, loose boards—particularly barge boards—damaged

OFF-SEASON WORK ABOUT THE FARM DAIRY . . .

windows and sashes, and leaking spoutings, should be given early attention, because a delay of a few months may result in deterioration which greatly increases the amount of repair work which has to be done.

Painting and Cleaning

When repairs have been completed buildings should be painted or treated with some other recognised timber preservative.

Creosote should not be used, because its strong odour is absorbed by dairy produce.

Inside walls, too, often require thorough cleaning to remove accumulated dust, spider webs, and any manure adhering to the walls and posts. Empty oil tins and odds and ends are often allowed to accumulate, though they are not in use about the dairy. As they harbour dust and dirt, they should be removed. When the interior of the dairy has been cleaned thoroughly the inside walls can be painted or whitewashed.

Clean and satisfactory surroundings and convenient equipment greatly assist in maintaining the dairy in a hygienic condition and making the daily work more pleasant.

The milking machine, separator, and cans and other utensils also require overhaul and attention during winter to ensure that they are in good condition and will give satisfactory service throughout the coming season. Breakdowns which could have been avoided often occur during the busy part of the season because the farmer has neglected to carry out a general overhaul during the off season.

Overhauling Milking Machines

In the course of their duties Farm Dairy Instructors hear many complaints about teat cups dropping off, vacuum being too low, slow milking, cows not milking out, etc. In most cases the faults can be traced to some defect in the milking machine. Efficiency in the milking machine is essential and winter is the time to overhaul the equipment and, if necessary, have it serviced by experts.

The vacuum pump must be in good order and capable of providing for any fluctuation in the vacuum demand; a machine must be entirely free from air leaks, especially at the pulsators, to maintain a constant vacuum. Pulsation speeds must be maintained (by checking belts that may be slipping, etc.), and ratios fixed by making secure the appropriate adjustments on the machine.

Farmers should check their milking machines each winter in the following way:—

First, check the vacuum pumps, direct off the pump, with a vacuum gauge that is known to be accurate. If the pump is in good order, it will pull a minimum of 25in. of vacuum at a speed recommended by the makers; if the reading is below 25in., the pump should be sent to the makers for an overhaul. Assuming that the pump is in good order, check the machine for air leaks in the following way: Assemble the machine and start it, screw down the relief valve, stop the pulsators over the ports, and shut off the taps. If the machine is free from leaks, the vacuum registered will be the same as that previously shown direct off the pump; if it is not, go over all the joints on the machine with a lighted wax taper. The point of the flame will be drawn into joints which leak. Pay particular attention to pulsators, sliding or rotary, which should be sent to the makers for refacing if they are found to be leaking, as efficient milking is not possible with leaking pulsators.

Renew cracked or perished rubbers and sealing rings, and continue testing for leaks until satisfied that the machine is absolutely vacuum tight. Relief valves are often found to be corroded and sticking and are quite useless for their purpose. It is very important that the relief valve should be sensitive to any fluctuation in the vacuum and should act as a safety valve to regulate any dangerous use in vacuum in the machine, especially at the teat cups. If necessary, clean the relief valve thoroughly and re-assemble it. The vacuum gauge must be accurate; it should be checked against a testing apparatus carried by some dairy factories or milking machine companies. If the vacuum gauge is inaccurate, have it adjusted.

Attention may have been drawn during the season to the presence of milkstone in the machine; milkstone is a source of contamination and must be removed. Instructions for the removal of milkstone from milking machines were given in an article "Cleaning Milking Machines and Dairy Equipment" by W. G. Batt, Supervisor of Dominion Farm Dairy Instruction, Department of Agriculture, Hamilton, which appeared in the November, 1949, issue of the "Journal." It is important, too, that every part of the milking machine with which milk comes in contact should be well tinned. Any part becoming bare of tin must be replaced or re-tinned.

Separators

Modern separators with their stainless-steel parts require very little attention other than flushing and the cleaning out of the oil reservoir and replenishing of the oil at regular intervals. Older types of separators may be rusty in places or otherwise becoming bare of tinning. If they are mechanically sound and warrant the outlay, they should be re-tinned, and the off season is the time to have this work done. Milk or cream cans, coolers, etc., on which the tinning is not satisfactory should be re-tinned during the off season.

Skimmed-milk Disposal

The method of skimmed-milk disposal is in many cases very unsatisfactory. Drums which have held sour or fermented skimmed milk are sometimes brought in and out of the separator room, or a tank similarly affected may be kept outside the separator room. Opportunity should be taken in the off season to do away with antiquated methods by installing a skimmed-milk pump, which not only saves a great deal of time, but eliminates insanitary conditions associated with unsatisfactory skimmed-milk disposal.

Milk or cream awaiting collection at the roadside must be protected from warm sunshine and contamination. If present facilities are inadequate, better arrangements should be made now. Other work which should be attended to may include: The removal of manure heaps which, through unavoidable circumstances, have accumulated around the yard; the scraping and cleaning of encrusted water-heater elements (mineral deposits on elements reduce their heating efficiency); or the checking of time switches and thermostats to ensure that a supply of boiling water is available. To clean and sterilise dairy equipment thoroughly the water used for washing must be boiling at the time cleaning is begun.

DAIRY PRODUCE GRADED FOR EXPORT

THE following figures showing quantities of dairy produce graded for export during April and for the 9 months ended April 30, 1950, with comparative figures for the same month and 9-monthly period of 1949, have been compiled by the Dairy Division of the Department of Agriculture from figures supplied by divisional officers at the various grading ports:—

BUTTER—

		Tons			Tons
Period	Creamery	Whey	Total	Percentage inc. or dec.	Total in store at end of mth.
April, 1950	5,064	198	5,262	—	26,245
April, 1949	9,360	212	9,572	—	29,295
Increase or decrease	—4,296	—14	—4,310	—45.027	—3,050
For 9 months ended 30/4/50	138,320	2,725	141,045	—	—
For 9 months ended 30/4/49	137,050	2,483	139,533	—	—
Increase or decrease	+1,270	+242	+1,512	+1.083	—

CHEESE—

		Tons			Tons
Period	White	Coloured	Total	Percentage inc. or dec.	Total in store at end of mth.
April, 1950	5,670	1,720	7,390	—	28,286
April, 1949	7,248	556	7,804	—	19,238
Increase or decrease	—1,578	+1,164	—414	—5.304	+9,048
For 9 months ended 30/4/50	72,528	20,536	93,064	—	—
For 9 months ended 30/4/49	82,984	4,753	87,737	—	—
Increase or decrease	—10,456	+15,783	+5,327	+6.071	—

If these figures are converted into butterfat equivalent, there is an increase of 2.118 per cent. in butterfat graded for the 9 months as compared with the corresponding period of the preceding season. It should be noted that the above figures refer only to butter and cheese graded for export, and that owing to diversions which may take place from time to time, they are not necessarily a true indication of production trends.

THE HOME GARDEN IN JULY

By S. O. GILLARD, Vegetable Instructor,
Department of Agriculture, Auckland.

GENERALLY July can be considered the dormant period of the year as far as gardening operations are concerned. Except in very warm localities there is little to be gained by sowing or planting out until August. Even in North Island districts where climate and soil conditions are favourable sowings should be small and limited to the more hardy kinds of vegetables such as peas, spinach, silver beet, beetroot, turnips, radish, and broad beans.

GARDEN operations should consist of clearing untidy areas, digging or trenching if the soil is in a suitable condition to work, turning in green crops, and cleaning and tidying the garden generally. The home gardener should take advantage of this opportunity to attend to odd jobs which could not be done in the busy season. Tools and spray apparatus can be overhauled and garden requisites (spray material, seeds, etc.) checked over. Seed boxes and frames can be made or any damaged ones repaired. Soil for seed boxes can be sterilised and the garden shed cleaned and tidied.

To have plants ready for planting out in August and September seed of lettuce, silver beet, cabbage, cauliflower, and tomatoes can be sown in frames. These should be placed in a sunny, warm position. If cloches are used, all seeds listed, except tomatoes, which require more heat, can be sown in well-drained soil which has been brought to a suitable condition by placing the cloches in position 10 to 14 days before. This enables the soil to warm up and some of the excess moisture to dry out.

Where climatic conditions are not too severe spring cabbage, cauliflower, lettuce, and shallots can be planted out in well-worked and well-drained soil. Asparagus and rhubarb beds can be cultivated, and, if not already done, can be manured. Provided the soil is in a workable condition the ground can now be prepared for new beds of asparagus and rhubarb. Organic manure such as stable or farmyard manure or compost, or failing this blood and bone and old stack bottom or straw, should be dug in. If the soil is heavy, it should be deeply dug or trenched and the subsoil loosened up to facilitate good drainage. When trenching it is an advantage if the strawy material is spread sufficiently to cover the soil on the bottom and up the face of each trench. This will help soil aeration and drainage and the straw will build up the humus content when decomposed.

Stored crops of potatoes, pumpkins, and onions should be sorted over and any decaying ones removed, and any shoots on potatoes should be rubbed off.

Jerusalem artichoke tubers can be sorted and the small ones can be set if the soil is in a workable condition.

The lighter types of soils that are not too wet and sticky can be dug over or trenched to improve aeration and drainage. Most soils, especially the heavier ones, are improved by being left rough after digging to expose them to the weather. This not only has a sweetening effect on the soil, but exposes insect pests or their eggs to the weather or to birds.

Trenching or double digging and subsoiling loosens, pulverises, and deepens the topsoil, allowing the roots of the plants to grow more freely in it, and facilitates the admission of air and water, and is also a means of incorporating manurial substances into the soil.

HEADING PHOTOGRAPH: Warm, sheltered, well-drained positions are best for the growing of early vegetables. Sparrow Industrial Pictures Ltd. photo.

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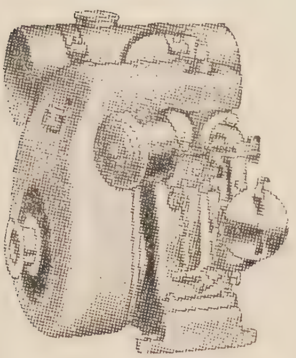

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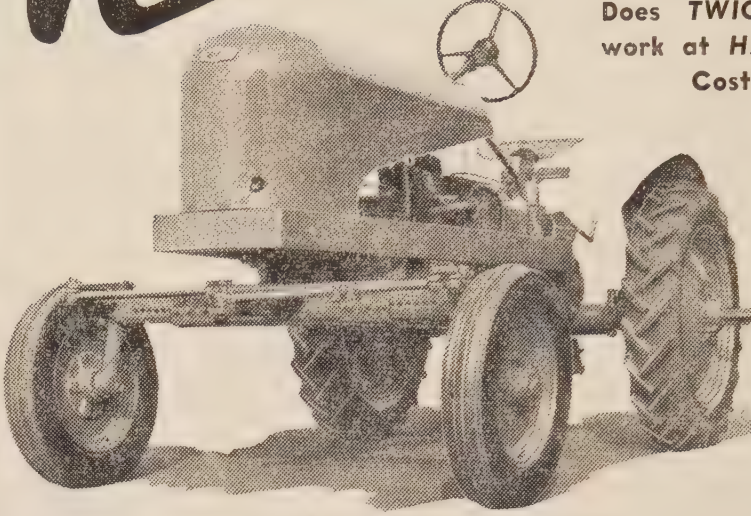

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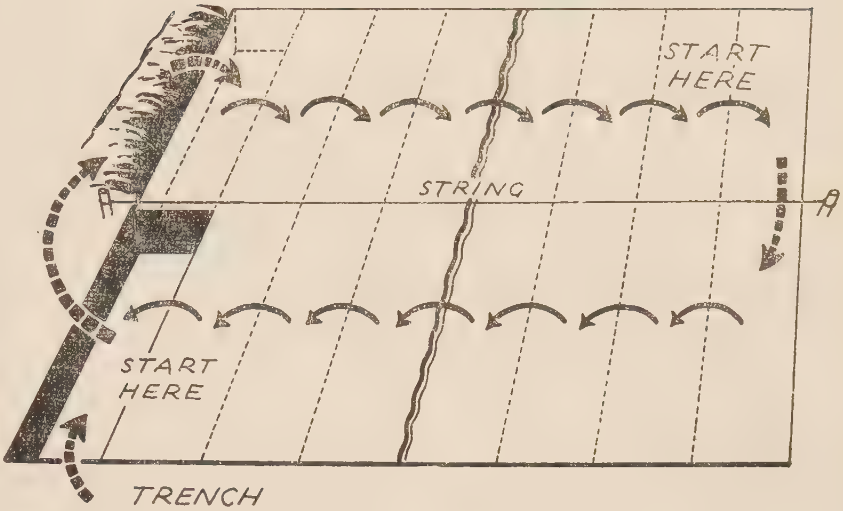

Diagram showing the method of trenching.

Usual Method of Trenching

In the usual method of trenching stable manure or other materials are first spread on the surface of the ground to be trenched. Then a trench is dug at one end of the plot to the required depth (usually the depth of the topsoil), and about 18in. wide, and the soil taken out is moved to where the work is to finish. The plot may be marked out into two equal parts, and the soil taken out of the end of one division, and, when the first division is finished, the last trench filled from the same end of the next division, which is worked in the opposite direction.

The next operation is to loosen up the subsoil of the first trench and cover it and the face of the trench with its quota of the material that was spread first (strawy material is best). This trench is then filled with the soil from the next trench. This operation is repeated and the final trench is filled with the soil that was taken out of the first trench. By this method the surface soil is kept in its proper place and the subsoil in its natural position. Deep digging is desirable on most heavy soils, and loosening up hard subsoils is important, as it improves drainage, which is very important to successful production.

It is important when deep digging or trenching not to bring the subsoil to the surface. Many soils give disappointing results if the subsoil is brought to the surface, where it frequently forms an infertile and nearly unworkable mass for many years.

Asparagus

The culture of asparagus dates back to the first part of the 16th century. The genus *Asparagus* belongs to the lily family. It comprises about 100 species. A few species, including the familiar asparagus vine—the one used by the florists—are cultivated for ornamental purposes, but most of them have no economic value. All the various forms and varieties of the vegetable now in common cultivation under the name of asparagus have been derived from one species, *Asparagus officinalis.* This is a branching, herbaceous plant, growing to a height of 3 to 7ft. from perennial rootstocks. The rootstock or "crown" makes new growth each year of from 1 to 3in., extending horizontally. It may be propagated from both ends or from only one, but in either case the older part of the rootstock becomes unproductive and finally dies.

Asparagus thrives best in a loam containing a large proportion of sand. Rich, alluvial, river-flat soils produce asparagus of large size and good quality, and if such conditions can be approximated in the home garden or induced by incorporation of humus in the asparagus bed site, the crop should do well. The soil must be well drained, for although asparagus needs a fair amount of moisture when growing, stagnant water in the soil will gradually kill the plants.

Asparagus is not difficult to grow and its success depends to a large extent on the thorough preparation of the soil.

The ground should be trenched at least 2ft. deep, and the subsoil below the bottom spit should be thoroughly broken up, at the same time any added ingredients such as sand or well-decayed natural manure or compost being mixed with the surface soil.

Although asparagus can be grown from seed sown in August or September in a properly prepared seed-bed and the young plants transplanted to their permanent position the following spring, it is perhaps more satisfactory for the home gardener to procure young plants.

After preparing the bed make a trench about 6in. deep and wide enough to accommodate the roots when spread at full length. The bottom of the trench should have a slight ridge in the middle over which the roots are set saddlewise so that the points of the roots tend downward. The roots are then covered to a depth of 3 or 4in. and the soil trodden down gently.

Allow at least 2ft. between rows and from 18in. to 2ft. between the plants in the rows. After planting it is an advantage to mulch the bed with a thin covering of good stable manure or with seaweed where obtainable. A mixture of equal parts of blood and bone and superphosphate plus 1/20 part of sulphate of potash applied at the rate of 1lb. a square yard is also recommended for asparagus.

When yearling roots are planted no spears should be cut the first year, and unless the plants are extra strong, cutting should be done sparingly the second season. In the third season (when the plants are 4 years old) plants are well developed and should stand fairly heavy cutting for about 8 weeks. After this all stalks should be allowed to mature.

In the North Island new beds of asparagus may be planted toward the end of the month if the land is reasonably dry, though August or even September is soon enough in the South Island.

Recommended varieties which can be procured as 1- or 2-year-old plants from all leading seedsmen are Connover's Colossal and Paradise.

Artichoke (Jerusalem)

The Jerusalem artichoke is really a tuberous-rooted sunflower, the tubers being the vegetable. It is very easy to grow and deserves a place in the home garden.

The plant is propagated from tubers, which throw out annual stems to a height of 6ft. or more. Artichokes will grow in almost any soil that will grow potatoes, and though they absorb large quantities of plant food, care should be taken that they do not receive too much nitrogenous manure, which causes them to develop top growth at the expense of tubers.

Tubers may be set during July or August 4in. deep in rows 3ft. apart, allowing 18in. between the sets in the rows.

Cultivation to suppress weed growth should be shallow while the plants are growing or damage may be done to the runners which bear the tubers.

Tubers will be ready for use the autumn following planting. Care should be taken when digging tubers to ensure that all of them are removed or any which are overlooked will start into growth and may become a nuisance. When lifted tubers may be stored in a dry place; they keep best in sand or dry sawdust.

White Jerusalem, the best variety to grow, has pure white tubers, almost round, with few and very shallow eyes.

Broad Beans

If a successional supply of broad beans is required or if seed has not yet been sown, a sowing should be made without delay as advised in the home garden notes in the April issue of the "Journal." Broad beans sown in May should have the soil drawn up to them as they grow and the terminal shoots pinched out as soon as the first flowers appear.

Brussels Sprouts

Brussels sprouts if grown in an exposed position should be supported. Individual staking of well-grown

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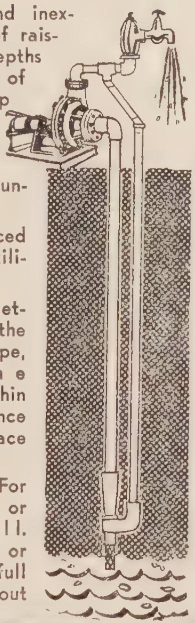

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plants is well worth while, but for most areas drawing up of the soil to the stems of the plant is usually sufficient. The sprouts should be picked as they mature, systematically, from the bottom of the plant, and as the lower side leaves turn yellow they should be removed; at this stage they snap off cleanly at the junction with the main stem.

Later-planted crops which are just beginning to develop their sprouts will benefit from a side dressing composed of equal parts of sulphate of ammonia, dried blood, and superphosphate applied along the plant rows at the rate of 1oz. a plant and hoed in when the soil is drawn up to support the plants.

Cabbage

Most home gardeners prefer to purchase their cabbage plants, but if it is desired to grow seedlings, seed may be sown now. A quick-maturing variety such as Enfield Market, Golden Acre, or Flower of Spring should be sown in a warm, sheltered position; where these conditions are not available it is advisable to use a cool frame or glasshouse. Seed is best sown thinly in boxes containing about 6in. of open-textured soil with a high humus content and covered with ¼in. of fine soil. The seed boxes should be kept moist and the plants should be thinned later if they are too thick to allow them to develop into stocky, well-rooted plants. When the plants are about 4in. high they should be placed outside to harden off before being planted out in the garden.

Spring Cabbage

Established cabbage crops should be cultivated to encourage growth whenever soil conditions will allow, and will benefit by a side dressing of nitrate of soda or sulphate of ammonia at the rate of ½oz. a plant. This can be placed in a band around each plant and hoed in.

It should not be allowed to touch the leaves or stem of the plant.

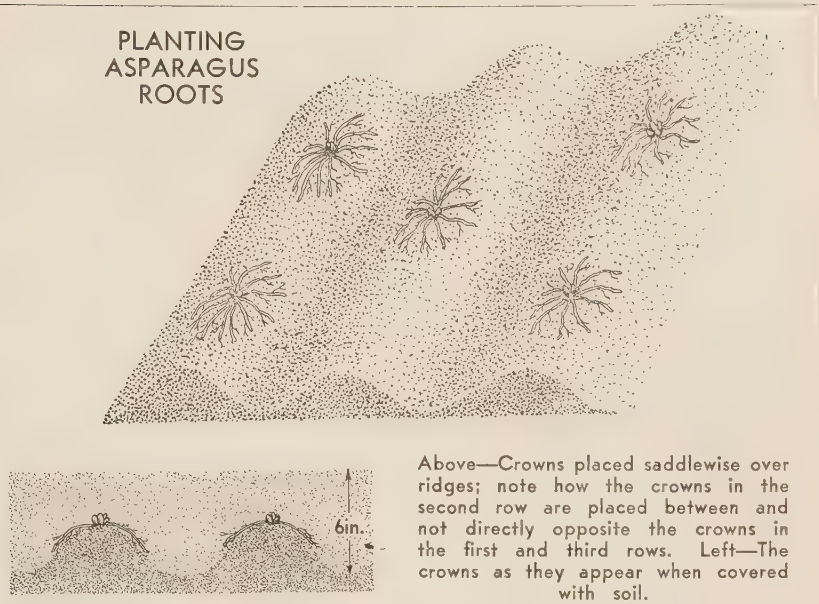
When the land is dry enough to prepare, spring and summer types of cabbage can be set out in July. The land should be dug well and limed. A good rich soil is essential for success, and if farmyard manure or good compost is not available, a mixture of 3 parts of blood and bone, 1 part of superphosphate, and 1/20 part of sulphate of potash, all by weight, will suffice. The fertiliser mixture should be sown evenly along the plant rows at the rate of 2oz. per foot of row and covered with sufficient soil so that the plant root does not come in contact with a too-heavy concentration, which is liable to cause a check to its growth.

Plants should be set out on ridges, allowing 30in. between each row. Early-maturing types such as Golden Acre, Enfield Market, Wakefield, Greyhound, Vanguard, and Earliball should be spaced 15in. between plants in the rows, with 18in. spacings for the larger types such as Succession and Drumhead.

Cauliflower

Seed may be sown or plants set out of the early varieties of cauliflower such as Early London and Phenomenal Early. The recommendations for growing cabbage apply also to cauliflower, though the cauliflower is a more tender plant and is more likely to fail if it receives a check during the growing period as a result of dryness, severe frost, excess moisture, or injury to the roots during transplanting.

PLANTING ASPARAGUS ROOTS



Above—Crowns placed saddlewise over ridges; note how the crowns in the second row are placed between and not directly opposite the crowns in the first and third rows. Left—The crowns as they appear when covered with soil.

Garlic

Garlic is useful for flavouring and other culinary purposes. Garlic is not usually propagated from seed, but is grown from cloves (parts of the bulb), whole bulbs being broken up into the small cloves; the outer cloves are best for replanting.

Garlic does well in a rich, light, well-drained soil which should be well dug and worked up to a fine tilth. The cloves may be planted in July or August. Draw drills about 1in. deep and 12in. apart and place the cloves in them about 6in. apart and cover and level the surface.

Peas

In localities where weather conditions are favourable an early sowing of peas may be made, preferably in light, well-drained soil. Peas grow well in cool weather, but if seed is sown when the soil is too wet, losses sometimes occur through the seed rotting before germination takes place. To obtain better drainage sow the seed on flat-topped ridges about 6in. high and 3ft. apart from centre to centre. Along the centre of the ridge draw out with the hoe a trench 2in. deep and 5in. wide with straight walls. Scatter the seed about 1in. apart along it, cover them, and level the soil. If fertilisers are necessary, a dressing of bonedust or superphosphate at the rate of 1 to 2oz. a square yard should be well worked into the soil before sowing.

Good varieties for early sowing are Blue Bantam, William Massey, Little Marvel, and Earlicrop.

Horse Radish

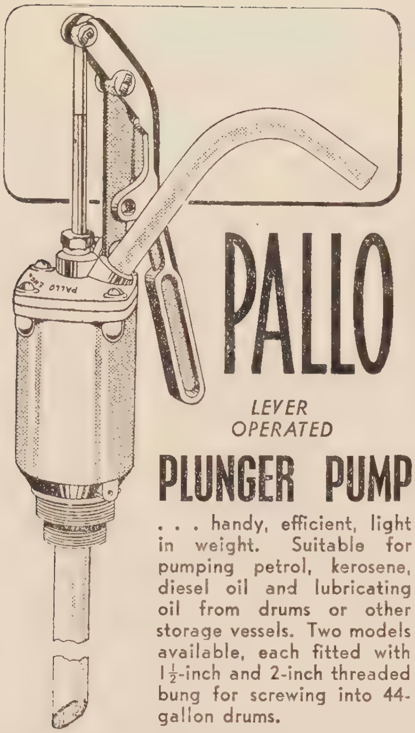
Horse radish is valuable as a relish and is well worth growing where space permits. Horse radish is propagated from roots or root cuttings usually about 6in. long and not thinner than a lead pencil. Horse radish is a perennial and is liable to spread. It is therefore best treated as an annual. About half a dozen roots will fill the requirements of the average family. It can be planted any time from autumn until spring in deeply dug, richly manured soil and will by next autumn have developed large succulent roots.

Set in rows 18in. apart with 12in. between the roots in the rows. Plant the roots at an angle of about 45 degrees, the thick end upward. Cuttings should always be carefully cut square at the upper end of the root and slanting at the lower to distinguish the ends, as the upper end must not be set deepest. No cultivation except to keep the surface free of weeds is necessary. When lifted roots may be stored in dry sand and used as required.

Lettuce

At this period of the year the ground is cold and little advantage will be gained except in very warm localities and where the soil is light and sandy by planting out lettuces until August.

Seed may be sown now for planting out next month and it is advisable at this time of the year to sow the seed in a cool frame or a seed box placed in a warm, sunny position. The seed box should be filled with 3 or 4in. of open-textured soil of a high humus content and the seed sprinkled thinly and covered lightly with fine soil. The seed box should be kept moist and germination will be quicker if a sheet of glass is placed over the top of the seed box. This should be removed in the daytime as soon as the seed germinates.



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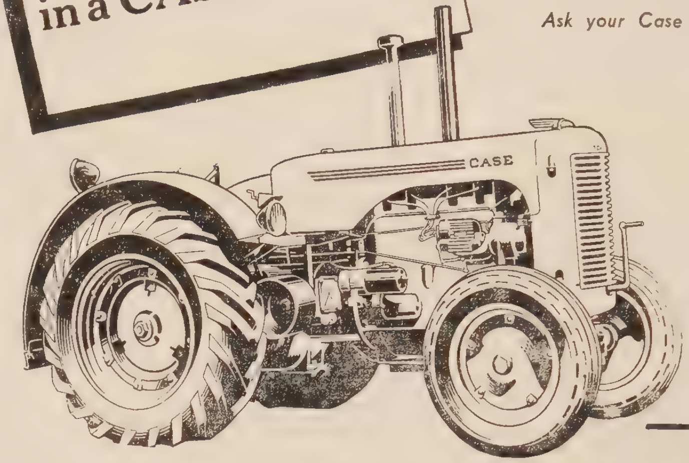

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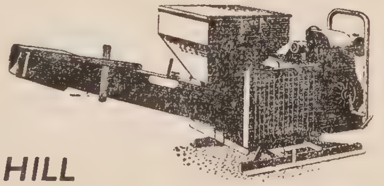

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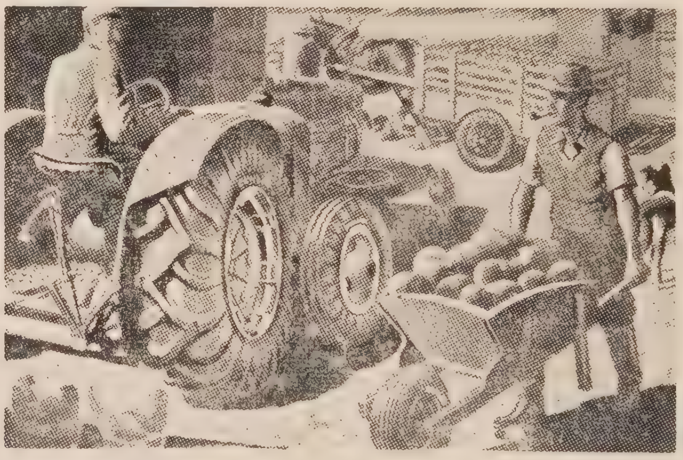

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Root Crops

Small sowings of radish, carrots, beetroot, and turnips can be made as soon as soil and weather conditions are favourable, but unless conditions are suitable sowing is best delayed. These later sowings will generally be found to do better than earlier sowings and usually come to maturity as quickly. A light, easily worked, well-drained soil is preferable for early crops. It should be rich in organic manure, though this should have been applied to the previous crop, as freshly applied manure causes root crops to fork. Radish, carrot, beetroot, and turnip seed should be sown ½in. deep in rows 12in. apart. Good varieties or types for early sowing are:—

Radish: French Breakfast and turnip-shaped.

Carrots: Early Horn and Chantenay.

Beetroot: Early Wonder and Egyptian (turnip-rooted).

Turnips: White Stone or Snowball.

Compost

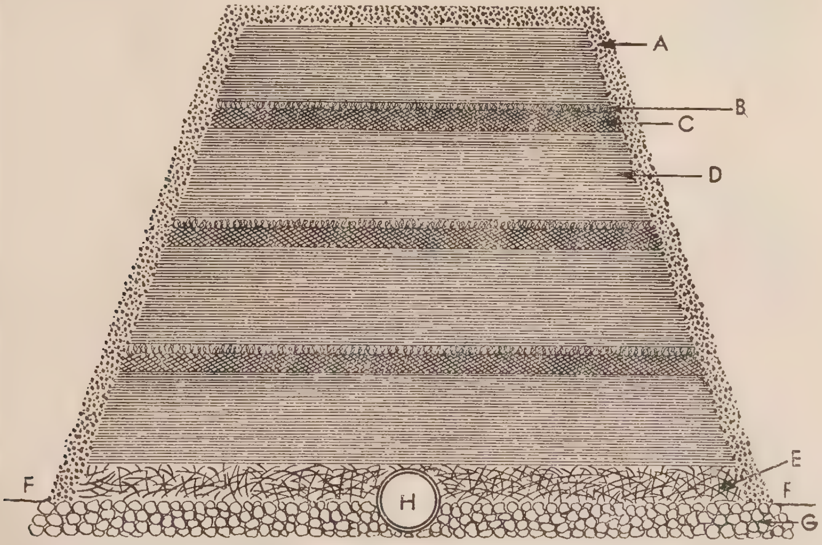
In recent years most home gardeners have realised the necessity for using compost, especially as stable or animal manure is so difficult to obtain. In most soils that have been extensively cultivated for a number of years without the return of adequate supplies of organic material to keep up the humus content it is difficult to maintain a good tilth. Soils become infertile and harder to work, and the maintenance of moisture content and aeration is difficult.

The importance in home gardens of maintaining the humus content of the soil by returning all organic waste matter from the kitchen and garden to the soil can hardly be over-emphasised.

[*Sparrow Industrial Pictures Ltd. photo.*

Lettuce plants grown in boxes should be thinned out as soon as the true leaves appear, allowing about 1in. each way between plants. This allows the plants to grow stocky with a good root system. They should be removed from the box with the soil attached.

Composting provides a convenient means of converting a great variety of otherwise waste material into humus. Moreover, if compost is reasonably well prepared, it is much less offensive than the noxious fumes from wasteful burning. Compost rotted mainly by putrefaction is much superior to raw organic matter dug into the soil.



Cross-section of compost heap showing how layers of various materials are built up. A—Soil. B—Soil and lime. C—Nitrogenous fertiliser or animal manure. D—Vegetable waste. E—Ripe compost, cow manure, or straw. F—Ground level. G—Clay. H—Air vent.

Good compost is a complete plant food containing nitrogen, phosphate, potash, and other essential elements of plant food, including calcium, iron, magnesium, manganese, silicon, and some of the trace minerals such as boron, cobalt, zinc, and iodine. Though once regarded as of little importance, trace elements are now recognised as having a profound influence on all-too-common deficiency troubles and diseases of plants.

Apart from being a plant food humus greatly influences the formation of desirable crumby texture in the soil, that is, a state in which it can be worked down easily to a good tilth. Humus binds light soils and increases their capacity for retaining plant foods and moisture; it improves heavy soils and reduces stickiness, particularly if lime is also present, and thus improves aeration and drainage. Humus darkens light-coloured soils, causing them to warm more quickly, and makes them less susceptible to erosion by wind or water.

Most home gardeners will agree that it is necessary to return to the soil all disease-free organic garden waste, but because of the work involved in building a compost heap and the attention it requires, such as tidying, watering, and turning, and the delay before the compost is ready for use, home gardeners sometimes prefer to dig garden trash directly into the soil. Usually an open trench is used in a part of the garden that is being dug. Successive spits of soil are turned over every few days to expose a new trench as the old one is filled with kitchen or garden trash.

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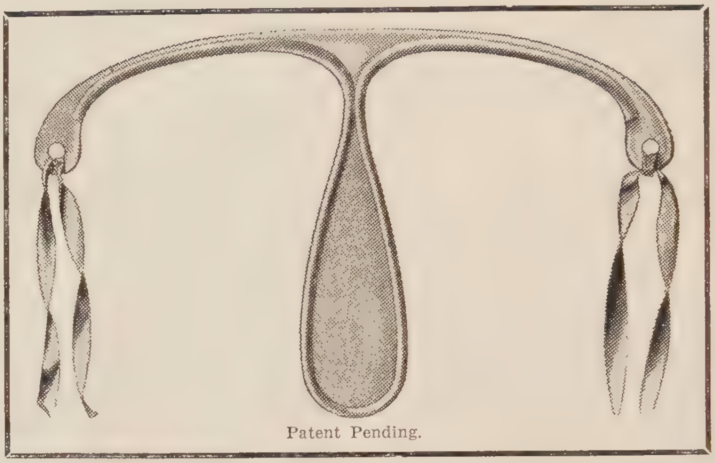
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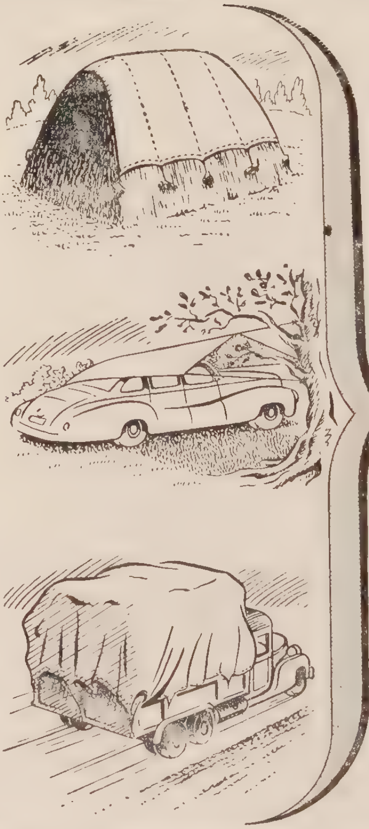

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This method is preferable to burning garden waste and where only rank, soft green vegetation is to be buried it is probably not inferior to composting. However, it is not suitable for material which requires a long time to decompose, nor can an area where rubbish has been dug in be used immediately for cropping, as nitrogen starvation of plants usually follows where thorough decomposition of organic material has not taken place. The reason for this is that the bacteria which break the material down use the readily available forms of nitrates.

Temporary acidity may also develop, especially during the early stages of decay, which may retard growth of plants or result in seed failing to germinate.

Composting Materials

Since most kinds of organic matter can be made into compost, there is a wide range of suitable materials. Because of their different qualities, some rot quickly, others extremely slowly, and for this reason discrimination in their use is desirable.

For the home gardener who has only a small compost heap in preparation at the one time woody materials such as cauliflower and cabbage stumps (unless bruised and chopped up) should not be added to the heap. Certain perennial weeds (such as convolvulus, couch grass, docks, and oxalis), printed paper, oil, creosote, paints, and diseased or insect-pest-infested plants should not be used in compost heaps, but should be burnt and the ashes added to the heap.

Organic material of all kinds can be used: Tea leaves, soot, feathers, dust from vacuum cleaners, scraps of waste food, coffee grounds, seaweed, and sawdust in small quantities. Large quantities of sawdust and shavings are best rotted in a separate heap, and quick decomposition can be brought about most effectively by using alternate layers of sawdust, animal manure, and soil.

[*Sparrow Industrial Pictures Ltd. photo.*

Burying soft green vegetation is preferable to burning it.

Site of Heap

The compost heap should be built in a sheltered position, but should not be overhung by trees where the roots will grow into the compost, or in a low-lying spot subject to flooding. As successful compost making depends among other things on the maintenance of the right temperature and moisture in the heap, it is necessary to shelter the heap from cold and drying winds and to shade it from excessive sunshine. There should be sufficient clear space on one side of the heap for a barrow. This space is also useful for the preparatory partial wilting of succulent green materials and the thorough wetting of dry materials before they are added to the heap. Both these practices contribute considerably to satisfactory rotting. A handy water supply for wetting the heap is also an advantage.

Making the Heap

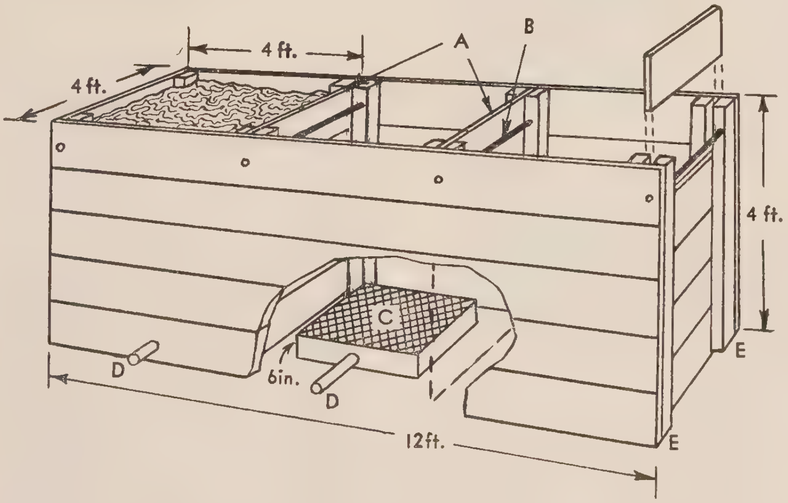
After the site has been selected clear off all vegetation; for most soils the heap can be built direct on the bare, forked earth. On very light soils a 2 or 3in. layer of clay (or conversely, a layer of gravel or sand on heavy soils) is an improvement. The soil on which the heap is built should be forked over before each successive heap is made, to prevent it becoming too consolidated and to permit the free entry of earthworms.

It is difficult to make good compost from small heaps in the open, as sufficient heat and moisture can seldom be maintained for satisfactory rotting and for thorough destruction of weed seeds or diseased material which may be present. For best results heaps should contain not less than 1 cub. yd. of material—that is, a pile about 4ft. long, 3ft. wide, and 2ft. 6in. high. Larger heaps are much more satisfactory.

If the composting materials are likely to be soggy, aeration and drainage are improved by making a channel in the foundation in which some coarse hedge clippings or drain tiles are laid.

In all cases the foundation of a new heap is improved by a thin layer of

SUITABLE BOX FOR MAKING COMPOST



A—Division boards in slots. B—Iron bracing rod. C—Heavy wire screen; the frame for the wire is 3ft. square and of 6in. wide timber. D—Projecting air inlet pipes. E—Hardwood posts driven into the ground. The raw material is put in the left-hand compartment, the first turn is made into the centre box, and at the second turning the compost is put in the right-hand section for its final stage. Partitions and the end of the last section are of removable boards in slots to facilitate handling. The box is on bare earth with no floor.

either ripe compost, rotted cow manure, maize stalks or straw, or charcoal or wood ashes.

If drainage is poor, the heap may be built at ground level, though a shallow excavation about 6 to 12in. deep is suitable for small heaps under ordinary conditions.

After the foundation has been prepared spread the various materials upon it in even layers from a few inches to 1ft. thick. The sappy and finer substances should be spread thinly and strawy or drier material in thick layers. The better the different kinds of materials are mixed—bulky and fine, soggy and dry—the quicker and more evenly will the heap decay.

On each layer of vegetable waste a thin layer of animal manure or nitrogenous fertiliser should be spread. On this layer sprinkle a covering of soil mixed with carbonate of lime or wood ashes or both. Alternate the layers in this manner to a height of 4 or 5ft. according to the size of the base. As the stack progresses slope the sides gradually inward to a ridge shape in a rectangular heap or a cone in a round one, leaving in both a slightly hollow, flat top to facilitate subsequent waterings. If the sides are sloped so that when the heap is finished the top is about half the width of the base, the final covering of soil, which should be about 2 or 3in. thick, will stay in position. During intervals in the building of the heap, heat may be conserved by covering it with old sacks.

Shape of the heap: The shape and dimensions of the heap are important, because they determine to a large degree conditions relative to temperature, aeration, and moisture content. The heap should not be flat, but should be pyramid shape, though a conical heap, which exposes the least surface per volume, is best for small heaps. The height of the heap should depend upon the materials used—the coarser the materials the higher the heap may be—and the amount of ventilation provided at the base and in the body of the heap. Undue consolidation, which is likely to cause slow decomposition and produce material resembling silage rather than compost, should be avoided.

Compost Boxes

For making small quantities of compost, boxes or bins are recommended. Such containers are convenient, tidy, efficient, and are also easily protected from extremes of weather. A large packing case without top and bottom or two cases joined make a simple and cheap container. A roof or cover is desirable and a sheet of corrugated iron will serve this purpose.

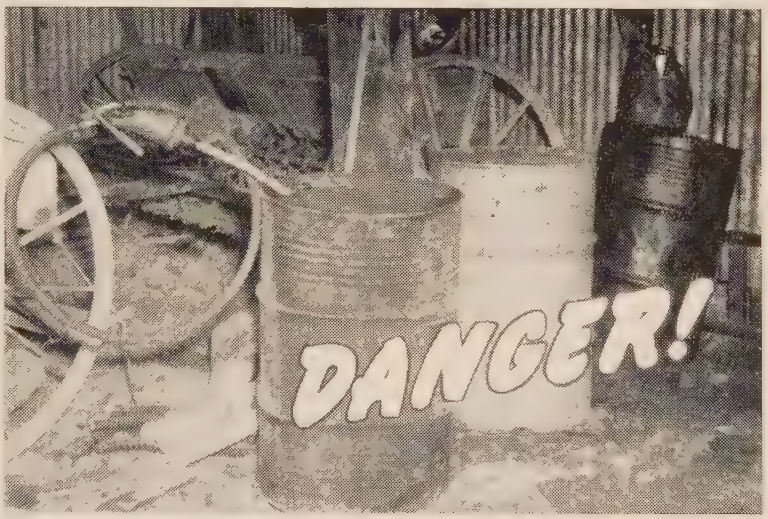
Turning: In about 4 to 10 weeks the heat begins to decline according to temperature (rotting is quicker in warm weather than in cold) and the heap should be turned, placing the outside to the inside. The mass will then be darkening in colour and will have begun to break down. Material should be emptied out of a box or bin and forked back, or if two boxes are used, it may be forked from one box into the second. The heap should be watered, if necessary, to keep it damp. The heap should be covered and left for a further 8 weeks, when the compost should be ready for use.

Storage

Generally when compost is fully mature it is best to apply it; it should be thoroughly mixed into the ground. If, however, there is a likelihood of leaching from heavy winter rains or if the soil is frost-bound or waterlogged, storage may be advisable. Compost is best stored under cover on an earth floor. Stored compost should be kept moist by covering it with wet sacks.

Applying Compost

Home gardeners seldom have an over-supply of compost, and it can be used to best advantage if mixed into the top 4in. of soil. If compost is properly rotted and only a small amount is available, it can be placed in the seed drills, but it should be mixed with the soil before seed is sown.



THE storage of petrol, kerosene, diesel oil, and lubricating oils in an implement shed or barn should be avoided. The risk of fire is ever present with fuels and oils, especially when drums are left open to the atmosphere. The ideal is to store them under lock and key in a separate shed, well ventilated and away from others, but failing this they are better stored in the shade of trees, away from sheds, and tilted in such a way that rain runs to one side of the drums and away from the bungs. Petrol fires or explosions, as well as causing accidents that can result in death, can cause serious loss of machines and buildings if they occur inside sheds.

Keep naked lights away from the vicinity of fuels and oils, which should be stored under lock and key where children have no access to them.

—*C. J. CROSBIE, Farm Machinery Instructor,*
Department of Agriculture, Christchurch.

Radio Broadcasts

THE following radio talks will be given to farmers from Station 1YA Auckland at 7.15 p.m.:—

July 5—"Pasture Management on a Dairy Farm: Grazing of Calves," by C. E. Ballinger, Instructor in Agriculture, Department of Agriculture, Whangarei.

July 12—"Pregnancy Diseases of Sheep," by I. G. Watt, Veterinarian, Department of Agriculture, Auckland.

July 19—"The Country Girls' Clubs' Second Conference," by Mrs. E. E. A. Topping, Rural Sociologist, Department of Agriculture, Auckland.

July 26—"Young Farmers' Clubs," talk arranged by Kaitaia District Committee, New Zealand Federation of Young Farmers' Clubs.

The following talk will be given from Station 1YZ Rotorua at 7.15 p.m.:—

July 13—"Young Farmers' Clubs," talk arranged by Whakatane District Committee, New Zealand Federation of Young Farmers' Clubs.

Radio talks will be given to farmers from Station 4YA Dunedin at 7.30 p.m. as follows:—

July 7—"The Extension Division and the Farmer's Wife," by Miss E. G. McNab, Rural Sociologist, Department of Agriculture, Dunedin.

July 26—"Rose Culture," by C. K. Ellis, Horticultural Instructor, Department of Agriculture, Dunedin.

Other talks are given from 1YA Auckland on Tuesdays at 12.35 p.m., 2YZ Napier on Tuesdays at 7.10 p.m., 2YA Wellington on Thursdays at 12.35 p.m., and 3YA Christchurch on Mondays at 12.20 p.m.

Pig Broadcasts

Under the auspices of District Pig Councils broadcasts will be delivered in July as follows:—

Rotorua—1YA, on July 27, at 12.35 p.m., "Avoiding Checks after Weaning," by A. F. Barwell, Supervisor, Bay of Plenty District Pig Council.

Wellington 2YA, on July 18, at 7.15 p.m., "The Value of Good Piggery Layout," by C. M. Bailey, Supervisor, Taranaki District Pig Council.

Christchurch—3YA, on July 20, at 7.15 p.m., discussion on "Recent Research in New Zealand and Overseas," conducted by H. W. McIntosh, Supervisor, Canterbury District Pig Council.

Common Faults in Hive Management

Seasonal Notes for the Domestic Beekeeper

ITALIAN bees have proved themselves under all beekeeping conditions in New Zealand and the domestic beekeeper who desires to achieve pleasure from handling bees and secure the maximum honey crop from them should ensure that his apiaries are stocked with the best type of bee. This point is made by R. Goddard, Apiary Instructor, Department of Agriculture, Tauranga, who in a survey of common faults in domestic beekeeping methods draws attention to to the fact that many domestic beekeepers continue to keep black and crossbred bees in their apiaries.

BLACK and crossbred bees are inclined to swarm readily, are not handled easily, and at times can be extremely vicious. Further, sac brood disease, which is caused by a filterable virus, appears to be more prevalent among the darker strains of bees in some areas and, although it is not one of the really serious bee diseases, a heavy and prolonged infection causes a hive to lose bee strength rapidly and it does not recover in time for a good surplus crop of honey to be stored. If, however, the affected colony is requeened with a good, vigorous, young Italian queen when the disease is first noticed, it usually recovers in a short time.

After winter it is quite evident in many apiaries that beekeepers do not carry out the desired routine. They never clean the bottom board of debris and, although the bees may have deserted the bottom hive box and are inhabiting the top box, no attempt is made at the appropriate time in spring to reverse the two boxes. This is important and should not be overlooked.

Queenless hives are encountered regularly in domestic apiaries, but it would appear that many beekeepers are not aware of this fact. When a hive is opened and the bees continue with a high-pitched humming, it is usually a cry of distress by a queenless colony. To make sure that this is so the brood nest should be examined and if there is no sign of brood and the bees are endeavouring to build queen cells, the colony is generally queenless. If a queenless colony is fairly strong in worker bees and has not been queenless very long, a frame of eggs and young brood may be transferred from some other hive to enable the bees to raise a queen. A weak queenless colony is not worth persevering with as a separate hive unit and may be united with a hive containing a laying queen.

[Rendell's Photo Service photo.

Queen excluder placed above second brood chamber, allowing two boxes for the use of the queen.

Townsfolk often complain about the number of swarms of bees flying in October to December. It is evident that many domestic beekeepers disregard swarm control completely and, in doing so, they not only lose their bees but also a potential crop of honey. Provided the queen is not old and is given ample laying room and any queen cells formed in the colony are destroyed at each inspection every 9 or 10 days, swarming can usually be prevented.

Excess drone brood in a hive may cause premature swarming of the colony. If the frames are not tightly wired and the comb foundation is insecure, the weight of the clustering bees causes the comb to sag, and much drone brood is then produced by the bees. This fault has been noticed frequently, but can be avoided if the domestic beekeeper ensures that the foundation is securely fixed in the frames before they are placed in the hive.

Queen excluders are invaluable for swarm control and in preventing the queen from laying in the honey supers. However, the haphazard use of excluders by many domestic beekeepers often has an adverse effect on colony production. To bring a colony up to peak strength beekeepers with limited experience of apiary management should not confine the queen to the lower box for the season, but encourage her to breed in two boxes.

Big crops of honey are lost each season by the beekeeper who fails to add additional supers to the hive as they are required by the bees for further storage space. Brood nests become so clogged with honey that the queen cannot lay, the colony loses strength gradually, and the field bees are forced into idleness. This should be avoided at all costs.

A full sheet of comb foundation properly wired results in good worker combs suitable for brood rearing, with a minimum of drones.

Another common fault noticed in domestic apiaries is the placing of comb foundations in the brood nest late in the season after the main honey flow has ceased and when winter preparations have been commenced. The bees will not draw out comb foundation under these conditions and, if frames of foundation are interspersed with brood combs, there is not only a danger of brood dying, but the foundation often prevents the bees reaching combs of honey which are necessary for their existence.

Neglected Hives

In attempts to overcome the sugar shortage of the war years many people in New Zealand bought hives of bees without any experience or knowledge of apiary management; consequently officers of the Department of Agriculture are finding hives that are not attended to year after year, and many of those hives are liberating numerous swarms which are establishing themselves in irregular shelters throughout the country and constituting a serious menace to beekeeping.

The Department urges beekeepers who no longer require their hives and are not prepared to give them the necessary attention to dispose of them to a qualified beekeeper or have them destroyed.

If a sale is contemplated the local Apiary Instructor of the Department of Agriculture should be communicated with for the necessary removal permit. This precaution is necessary to prevent the possible spread of bee diseases.

Poisoning of Sheep by Goat's Rue

By H. D. LeSOUEF, Veterinarian,
Department of Agriculture,
Wellington.

GOAT'S RUE *(Galega officinalis)*, which grows prolifically in the Manawatu River flats, has long been regarded as poisonous, although fatal cases occur only occasionally. The following is cited as being a typical example of the conditions under which deaths are likely to occur.

A FLOCK of 700 prime wethers grazing on good subterranean clover pasture was moved on foot from a Tangimoana farm on Friday, January 27, en route to the Levin abattoir. By midday on Sunday they had reached the Whirokino bridge area and were spelled there over lunch time. The sheep grazed on goat's rue, which grows prolifically in the neighbourhood. They reached a holding paddock near Levin at 3.30 p.m., and at 5 a.m. on Monday 12 were found dead and a number were showing signs of sickness, being reluctant or unable to rise. It was decided to move the remainder by motor lorry for the rest of the trip, and they were yarded with dogs after some delay, loading being begun about 11 a.m., by which time 26 sheep were dead. At Levin the remainder of the mob was put into a clean paddock with a very short growth of grass. A few more deaths occurred over the next few days, bringing the total up to 43.

Goat's rue growing on a roadside.

Post-mortems Made

The flock was seen in the paddock by the author on Monday, January 30, and several post-mortems were made there and at the abattoir, the findings being similar in each case. The symptoms shown were listlessness and inappetence with a staggering gait when moved, and the sheep later lay down squarely on the brisket until death without struggling occurred.

A normal temperature was shown in the sick sheep, and those that were down could take only a step or two when lifted before collapsing again. Death took place within a few hours of the first symptoms showing up. The post-mortem findings showed the wethers to be in good condition, with considerable fluid in the body cavities and oedema and congestion of both lungs and liver.

Development of Udders

An interesting complication in this particular flock was the development of the udders, with a very small amount of milk in the teats, due to the effect of continuous grazing on subterranean clover. Seeds in the contents of the rumen were identified by the Botany Division of the Department of Scientific and Industrial Research as those of goat's rue.

Slaughter of the remainder of the mob was begun on February 5 with 20 sheep, and thereafter small lots were killed each week until slaughtering was completed. All carcasses were completely healthy and, except for the udder development already mentioned, nothing abnormal was found.

The case described shows that loss through poisoning is likely to occur among sheep that are brought into contact with a plentiful growth of goat's rue when they are hungry, such as during droving or when they are held in small paddocks or pens before crutching or shearing. Treatment by dosing with a purgative, such as Epsom-salt, though effective in some cases, is not practicable in a large flock, and the best course is to give affected sheep complete rest where feed is readily available.

METEOROLOGICAL RECORDS FOR APRIL

Station	Height of station above M.S.L. (ft.)	Air temperatures in degrees (Fahrenheit)				Rainfall in inches					Bright sunshine hours
		Approx. mean	Difference from normal	Absolute maximum and minimum		Total fall	No. of days of rain	Difference from normal	Maximum fall		
				Maximum	Minimum				Amount	Date	
Kerikeri	201	61.2	+1.2	78.2	41.0	8.14	12		2.78	23	158.0
Auckland	160	61.2	+0.0	74.8	45.6	5.07	11	+1.23	1.80	14	167.6
Tauranga	10	59.2	+0.8	78.1	40.3	4.97	14	+0.25	2.56	14	197.0
Ruakura	131	56.4	—0.9	75.8	32.0	3.28	11	—0.44	1.34	14	169.2
Rotorua	980	55.2	+0.1	78.0	34.0	4.47	10	—0.04	1.75	14	168.6
Gisborne	12	57.8	—1.0	79.7	39.8	7.52	15	+4.09	2.98	23	127.9
New Plymouth ..	160	57.2	—1.0	69.5	42.0	3.02	8	—1.64	1.73	4	165.4
Napier	5	58.0	—0.6	74.6	38.2	2.97	8	+0.36	1.11	23	132.8
Taihape	2157	51.3	—1.2	69.4	33.8	2.24	10	—0.56	0.82	14	
Wanganui	72	56.6	—1.2	71.1	36.0	1.96	8	—1.28	0.75	5	150.3
Palmerston North	110	55.3	—1.5	73.8	38.2	1.72	11	—1.65	0.57	12	118.2
Waingawa	350	53.3	—0.6	72.9	32.0	1.82	11	—1.09	0.48	6	104.0
Wellington	415	53.8	—1.9	70.7	41.2	4.86	14	+1.32	2.11	5	115.7
Nelson	24	55.3	—1.1	72.1	35.8	3.54	5	+0.50	1.98	11	183.4
Blenheim	12	52.9	—3.2	75.2	34.1	1.45	8	—0.33	0.72	11	161.2
Hokitika	12	51.8	—1.4	68.8	34.1	6.06	10	—3.33	1.80	9	202.8
Hanmer Springs ..	1225	48.3	—1.7	73.0	29.0	4.28	11	+0.95	1.29	24	130.3
Christchurch ..	22	51.8	—1.7	72.7	34.2	1.74	12	—0.10	0.55	6	124.1
Ashburton	323	50.6	—1.8	73.8	35.2	3.07	12	+0.77	0.71	14	132.6
Timaru	56	51.6	—1.6	78.8	34.4	1.56	12	—0.05	0.45	12	146.8
Alexandra	520	49.6	—1.9	74.0	28.6	0.18	5	—1.35	0.10	6	197.9
Taieri	80	49.4	—1.9	79.8	30.5	0.74	13	—1.65	0.13	27	149.6
Invercargill ..	32	49.5	—1.0	68.0	32.0	3.17	20	—0.89	0.56	4	117.2

Growing Bulbs under Cover for Winter Flowers

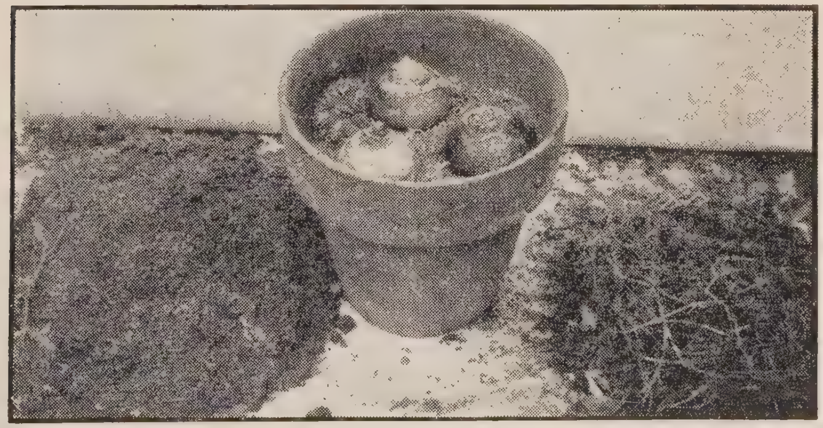
FLOWERS for indoor decoration become rather scarce about June, July, and August in New Zealand, and that fact has made the "forcing" and indoor culture of bulbous subjects increasingly popular during the past few years. In this month's article for the flower gardener C. K. Ellis, Horticultural Instructor, Department of Agriculture, Dunedin, discusses the growing of bulbs under cover and also offers advice on the control of pests which are likely to attack plants during the coming season.

[*Douglas Elliott photo.*

Spring crocuses are excellent subjects for pot or bowl culture to provide early indoor decoration.

MANY amateur gardeners in New Zealand own small, unheated glasshouses capable of giving excellent service provided the owner does not become too ambitious and attempt to grow subjects which fail to thrive within the temperature range his small structure can offer. By careful selection of bulbs hardy enough to stand frost he can secure pleasing displays of bloom, the protecting cover of glass overhead being sufficient to induce early flowering without the risk of inclement weather damaging the blooms.

The procedure is not complicated, but if the venture is to be successful, the receptacles must be watched closely for the first appearance of foliage. Pots must be well "crocked" with pieces of broken pots, so that the drainage hole is covered but sufficient space is allowed for free escape of excess water. That is achieved by placing the concave surface of the crock downward. The number of bulbs in each receptacle is governed only by its size, but each bulb must have adequate space for the development of roots below and foliage above.



[*Photo News Ltd. photo.*

In the preparation of pots for bulbs to be grown in a greenhouse a layer of rough organic material (right) is placed on top of the crocks and covered fairly deeply with potting soil (left). The bulbs are then put in place and more soil packed round them so that the soil surface is about $\frac{1}{2}$in. below the rim of the pot. The tops of the bulbs should be just below the soil surface.

When the potting has been completed the receptacles should be "plunged," either in the open or in a glass-covered frame, in coke breeze or some other such open, gritty material. This material should be of such a depth that it covers the tops of the pots with a layer about 1in. thick. As soon as roots have developed and vigorous top growth has started the receptacles should be moved to the greenhouse.

From this stage onward cultivation is almost the same as for any other greenhouse plant. Adequate water must be supplied until after the time of blooming, and ventilation must be free on all but the most unfavourable days. When the flowers are in an early stage of blooming the receptacles may be cleaned and the display taken into the house, where undoubtedly it will be admired by all.

As the flowers fade the plants should be returned to the greenhouse, and if the bulbs are required for further use, they should be fed with weak liquid manure for a short time and then allowed to die off by gradually lessening the supply of water.

Among the bulbs suited to greenhouse culture are alliums, chionodoxas, erythroniums, snowdrops, some types of lilies, muscari, scillas, tigridias, zephyranthes, and a wide range of tulips, daffodils, and hyacinths.

Bulbs in Fibre

The great advantage of growing bulbs in fibre is that drainage holes are not essential, so that decorative bowls may be used and placed on polished furniture or tablecloths without the fear of staining which attends the use of ordinary pots. However, a proportion of the bulbs grown in this way almost always produce only mediocre blooms, mainly because of a few simple mistakes common in general management. The most common error is to seek quick growth by keeping the bulbs in too close a temperature or supplying too much water.

A desirable mixture for this type of bulb culture is prepared from peat fibre, sand, charcoal, and shell grit. Bulb fibre obtained from a nurseryman is usually extremely dry and should be moistened thoroughly before being placed in the bowls by spreading it out in a thin layer and sprinkling it with water. It should then be heaped up and left for some hours

[*Douglas Elliott photo.*

Lachenalias make a brave showing in the garden in spring, and their bulbs are also suitable for cultivation in fibre in small containers.

so that the water can penetrate thoroughly. It is ready for use when it is fairly moist but still crumbly.

The fibre should be pressed firmly into the bowls and holes dug for the bulbs just deep enough to bury them, but with their tips level with the top of the fibre, which should be ½in. below the rim of the vessel. The bulbs should be set so that they almost touch each other. A thorough watering should be given, and about ½ hour later the bowl should be tilted over a sink to drain off surplus water that has found its way to the bottom. This draining must be done after every watering.

Then the bowls must be plunged in the same way as pots of bulbs for the greenhouse. If outdoor accommodation is not available, the bowls should be placed in a dark room or cupboard where a cool temperature can be maintained and ventilation is available. Whether the bowls are plunged in the open or stored in a cupboard, they must be inspected weekly. Should mould, slime, or any other fungal or algal growths appear on the surface of the fibre, a little powdered charcoal should be sprinkled over it and gently scratched in with a fork or stick and the bowl left in the open air for a couple of hours before being returned to the cupboard or plunging pit.

From the time the foliage appears the bowls must be kept in full daylight, but the cool temperature must be maintained or a lot of leafy growth will be made and the flower buds may fail to develop.

Feeding the bulbs before they flower is not necessary and, in fact, often leads to failure.

Hyacinths, daffodils, and tulips can be grown successfully in bowls, and small receptacles may be used with good effect for crocuses, muscari, snowdrops, scillas, and lachenalias. Many other subjects can be treated in this way, but an adequate knowledge of their habits comes only with experience and after success with the simpler types named.

Forcing Bulbs

To a limited degree bulbs are forced when they are grown under a cover of glass in a garden frame or unheated greenhouse, because the protection provided speeds up the progress of growth and the development of flowering stems. The use of artificial heat allows the gardener to carry forcing a stage further, but there is a distinct difference between the culture of bulbs in a cool greenhouse and the true forcing of bulbs to provide cut flowers for decoration during winter. Bulb forcing cannot usually be undertaken successfully by the average amateur gardener. The most desirable type of glasshouse and heating arrangement is usual only on the property of professional gardeners.

The bulbs must be started very early and, because they are to provide masses of cut flowers, space must be conserved, so normally they are grown in boxes rather than in pots. Though the purpose is to induce the bulbs to flower as early as possible, the subjects are treated normally at the start—that is, they are boxed up, plunged in the open, and allowed to make roots naturally. After a month or 6 weeks the boxes may be moved to a frame, but the bulbs must still be allowed to develop very gradually.

Placing unrooted bulbs in high temperatures is inviting disaster, for the only result will be a mass of sickly, yellowed foliage and an almost complete absence of flowers.

Heat is of real assistance only after the flower buds have begun to rise and swell, and in most cases the real forcing is not done until the buds are almost fully developed and almost ready to show colour.

Roman hyacinths are probably the finest subjects for forcing, for they can be relied on to bloom in midwinter. Such bulbs planted in a 6in. pot are quite useful for the house, but to provide a mass of flowers for cutting they must be placed in boxes as closely together as possible.

Other subjects which force well are Dutch hyacinths, early-flowering daffodils, freesias, Spanish irises, and most of the early-flowering tulips.

Control of Pests

After spending time and effort producing a brave show of bloom, all too many gardeners see the results of their work marred or destroyed by insects. Following are descriptions of some of the more common pests of the flower garden and recommendations for their control.

Aphides and Plant Lice

Aphides are distinguished by their plump bodies on which are borne a pair of cornicles from which honey dew is excreted. All forms attack plants by sucking the sap, and in severe infestations the hosts often wilt and ultimately die. Frequently a curling of the leaves is caused.

The life histories of the species are variable and complex. Generally, hard-walled eggs are laid in autumn and serve to over-winter the insects. With rising temperatures in spring the eggs hatch to wingless females, which produce living young without fertilisation. Within a fortnight the young themselves may be producing young, again all wingless females. Sexual forms appear in autumn. The females are then fertilised and lay eggs, thus completing the annual cycle. There are many variations from this general cycle.

The rose aphis (*Macrosiphum rosae*), known popularly as the greenfly, is perhaps the best-known insect in the garden because of its prevalence on the young growth of all types of roses. It also occurs on currants, apple, tomato, and rhododendron. In colonies some of the insects may be pink and others bright green. Where infestations are severe growth of the plants is retarded and foliage and flowers become distorted.

Rose aphides can be controlled by regular spraying with a solution of 1 part of nicotine sulphate to 800 parts of water, with ½oz. of soft soap to each gallon added and mixed well before spraying. The applications should be repeated each 10 days until all traces of the pest have disappeared.

The white fly (*Trialeurodes vaporariorum*), also known as the snow or ghost fly or mealy wing, is a serious greenhouse pest in New Zealand, attacking such ornamental subjects as chrysanthemums, ferns, and most pot plants. The adults are minute white insects whose bodies and wings are covered with a fine white powder. The eggs, which are attached to the undersides of leaves by short stalks, hatch in about 9 days to a form with legs and feelers, and are known then as nymphs. Soon the nymphs pupate and at this stage look very similar to scale insects, from which they are identified by the small spines covering their backs. Badly infected plants may have the undersides of the leaves covered with the empty skins from which the adults have emerged.

Control of white flies by spraying may prove difficult because the undersides of all leaves must be covered thoroughly. However, summer spraying oil is recommended in fortnightly applications at a strength of 1 part of oil to 60 to 80 of water. Nicotine sulphate is also recommended at 1 part in 800 of water, plus 3lb. of soft soap for every 100 gallons of spray. The most successful method of controlling white flies in an enclosed space such as a glasshouse is by fumigation with calcium cyanide (⅛oz. per 1000 cub. ft.), but this is an extremely dangerous substance, generating hydrocyanic acid gas on exposure to the air, and it should be used only by persons accustomed to handling such materials and familiar with the precautions necessary.

A parasite of white flies, *Encarsia formosa*, introduced to the Dominion a few years ago is proving quite a successful biological control.

Scale Insects (Coccids)

A large number of scale insects appear from time to time in gardens throughout New Zealand, but the San Jose scale (*Quadraspidiotus perniciosus*) probably has the widest host range and is most destructive to deciduous trees and shrubs. Because of its small size it may be overlooked easily. The female is about 1/25in. in diameter and circular; the male is oval. In profile the insect has the form of a flat cone. The scales are greyish in colour and when established and in colony form they produce a silver-grey encrustation on the stems. The insect passes the winter in a semi-mature state; by spring maturity is reached and the females, after mating, begin to give birth to living young and continue thus for several weeks. The young begin to reproduce 5 or 6 weeks from birth.

Natural enemies may control this pest to some degree, but spraying is necessary to secure complete freedom from it. During the dormant season deciduous trees and shrubs infected should be sprayed with 5 per cent. winter oil, and applications of 1 per cent. summer oil may be necessary if any insects appear later in the season.

Grass-grub and Brown Beetle

(*Odontria zealandica*)

The beetle of *Odontria zealandica* is about ½in. long and brown, with a darker margin to the wing cases, and has only a few hairs, these being along the sides of the body. It is of nocturnal habit and feeds on the foliage of a wide variety of plants. Normally only a single brood is reared each year, and adults are most common during November, December, and January. Usually the female lays eggs at the bases of stems of grass and other plants, and these hatch to grubs in 9 to 11 days, burrow below the surface, and begin feeding on the roots of many plants. In the depth of winter they cease feeding, burrow down a few more inches, and build smooth-walled cells in which they lie until about August. Then they ascend and feed again, grow to full size, and finally, after a pupation period, emerge as beetles at dusk.

Control is difficult, especially of grubs. A spray of 1lb. of 50 per cent. wettable D.D.T. to 100 gallons of water

Many varieties of early-flowering narcissus are suitable subjects for forcing.

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is useful to minimise the damage done to foliage by the beetles. Arsenate of lead powder (2lb. to 100 sq. ft.) with a spreader of sand will proof garden soil against grubs for some time. The same treatment may be applied to a lawn when it is being laid down. To proof an established lawn lead arsenate should be applied at the rate of 5lb. per 1000 sq. ft., mixed with an equal quantity of sand or fine soil and broadcast; this protects the lawn against infestation for about 3 years.

Wireworms and Click Beetles

Wireworms, the grubs of the click beetle, have tough, hard, brown or whitish skins. They are 1 to 2in. long and wriggle vigorously when disturbed. Though they attack and eat the roots of many garden plants, a favourite food is the potato, in which they drill holes. The feeding period appears to extend for 2 years or possibly longer. In autumn the grubs go deeper into the earth and in spring emerge as the narrow-bodied, dark-coloured click beetles.

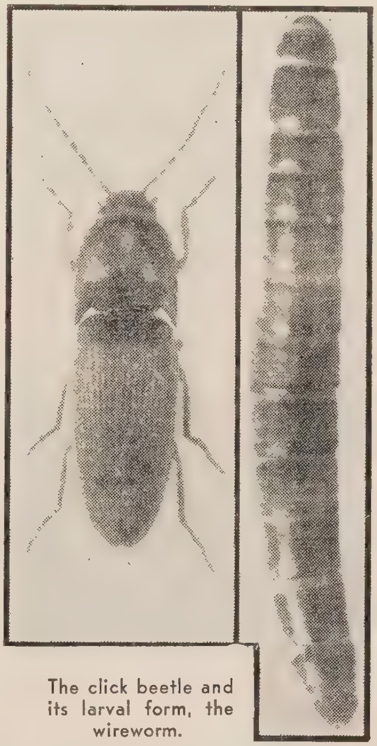
As a control measure crude naphthalene at the rate of 3oz. per square yard may be worked into the soil. Carbon bisulphide is useful where isolated plants are attacked.

The pest may be controlled on large areas by the following method: In spring clear the land of weeds, work it to a fine tilth, and drill wheat or oats as bait 2 to 3in. deep in rows 3 or 4ft. apart; about 14 days later make furrows 4in. deep alongside the baits, sprinkle calcium cyanide along them at the rate of 2lb. per 100yds. of row, cover the furrows, and compact the soil over them. This should be done only when the soil is dry. A good knowledge of the risks involved in using such materials is essential.

Earwigs (*Forficula auricularia*)

Though there is a native earwig, the species which causes concern in New Zealand gardens was introduced from England. These insects hibernate underground or in other shelter, the female usually with the eggs laid in autumn. Alternatively, the eggs may be laid in spring, but in any case they soon hatch to form the first brood. At first the skin is soft and white, but it becomes harder and brown as growth proceeds with a series of moults over a period of 4 months. The wings appear at the last moult.

The damage caused by these grass-grubs in a pasture shows the havoc the pest may wreak in a lawn.



The click beetle and its larval form, the wireworm.

Earwigs feed frequently on pollen, or even on the pistils of flowers, and are destructive of foliage of many kinds and especially of seedlings.

Clean gardening, trapping, and the use of poison baits are the best means of control. A suitable poison bait is 2lb. of wheat bran, 2½oz. of white arsenic, and 10oz. of fish oil scattered thinly over the surface of the infected area; one treatment in late spring should be sufficient.

Diamond-backed Moth (*Plutella maculipennis*)

The diamond-backed moth has a span of about ½in., the wings having whitish markings with zig-zag edges, so that when the two margins meet at rest the markings appear diamond shaped. It attacks such plants as stock, wallflower, candytuft, and alyssum as well as vegetables such as cabbage, cauliflower, broccoli, and turnips. The eggs are usually laid on the underside of a leaf, and after being hatched the larvae mine into the leaf, where they remain until the first moult. After that they feed on the lower side, eating all but the upper epidermis, which dries and breaks away from the remainder of the leaf, forming holes. When disturbed the larvae lower themselves to the ground by silken threads. Pupation takes place in open network cocoons on the undersides of leaves, and after emergence the adults do not feed. The life cycle may take place in 36 days under favourable conditions and, according to the season, there may be six or seven generations in a year.

The most effective control measure is spraying with ½lb. of 50 per cent. wettable D.D.T. per 100 gallons of water or dusting with a 1 per cent. D.D.T. dust. The spray or dust must cover the lower sides of the leaves well.

As the moths breed on cruciferous weeds such as shepherd's purse, these must be controlled strictly.

White Butterfly (*Pieris rapae*)

The caterpillars of the white butterfly often attack cruciferous plants in the flower garden but, unlike those of the diamond-backed moth, they do not drop on a silken thread and they devour all the leaf but the larger veins and the midrib. The caterpillar is 1¼in. long when fully grown, is of a leaf-green colour, and has a very narrow orange line running down the

[*Green and Hahn Ltd. photo.*

Grey aphides, about 6 times natural size.

centre of the back. The chrysalis is ¾in. long, with a pointed projection above the head and a keel-like ridge along the length of the back; the colour varies according to the surroundings. The chrysalis may be found attached to the food plant, fence posts, weatherboards of buildings, and in many other favourable sheltering places.

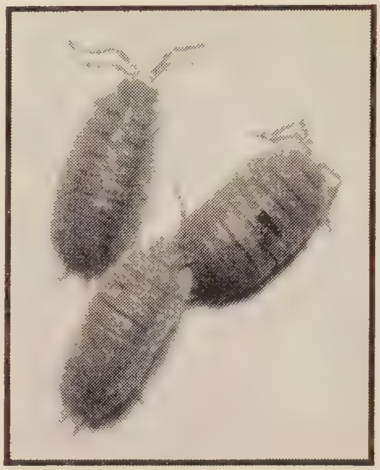
The butterflies have a wing span of 2in. The female is yellowish white with two black or dark spots on the surface of the fore-wings, and the male is whitish with a grey-green or bluish tinge and only a single spot on each fore-wing. The eggs, which are bottle shaped, are attached singly to the leaf surface in an erect position and are visible to the naked eye. Time of development from egg to adult varies according to temperature and humidity from 16 to 139 days.

There are two parasites of the white butterfly, one attacking the larva and the other the chrysalis, but such biological control is seldom sufficient in the home flower garden. The same insecticides as for the diamond-backed moth are recommended.

Magpie Moth (*Nyctemera annulata*)

Probably the best-known day-flying insect frequenting the flower garden is the magpie moth. It is black with white spots on the wings and orange bands on the abdomen. Its black, hairy, "woolly bear" caterpillars are useful in that they destroy weeds such as ragwort and groundsel, but unfortunately they also destroy cinerarias.

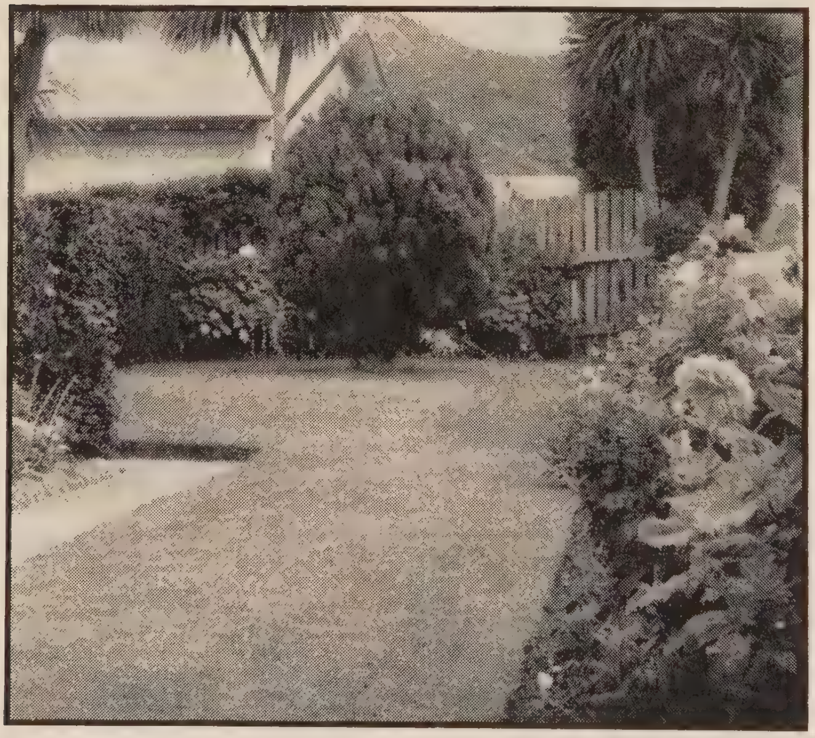
THE FLOWER GARDEN



[*Green and Hahn Ltd. photo.*

Woodlice or slaters, about 3 times natural size.

Small globular eggs, which are at first pale green and later yellow and grey, are laid in groups on the leaves of the food plant. After being hatched the caterpillars feed, and when this process is complete they spin cocoons in sheltered places, transform to chrysalises and soon emerge as adult moths. There may be several generations in a year.



[*Photo News Ltd. photo.*

A lawn well cared for adequately repays the attention given to it, and aeration of the turf is one of the major items of maintenance.

Control can be effected on cinerarias and other garden plants by spraying with arsenate of lead (1oz. to 4 gallons of water) or by the use of derris dust. D.D.T. (1lb. of 50 per cent. wettable powder to 100 gallons of water) may also be used with good results.

Woodlice or Slaters

The slater belongs to an animal group known as the crustacea and bears seven pairs of legs. Behind the last pair of legs are four white patches, the gills, which enable the animal to breath moist atmospheric air. After the eggs have been laid in spring they are carried by the female in pouches on the underside of the body until they hatch and often for a short time afterward. The young resemble the adults closely and during growth moult frequently, newly moulted slaters being almost white.

Slaters are normally scavengers, feeding on dead organic matter, but they do attack seedlings and tender parts of plants. They can be controlled by scattering in the places they frequent a dust containing 5 per cent. of active D.D.T.

Garden Work for July

Forking of lawns is important. Forcing the prongs of a garden fork into the soil at frequent intervals improves the physical condition by allowing free drainage and aeration. Root growth is promoted and a more vigorous turf encouraged.

Drainage of the soil is a factor well worth consideration at this time of year. A good plan, especially where the garden is new, is to dig a few holes here and there and leave them open during the wettest season so that any waterlogging below ground level can be seen and remedial steps planned. Few plants can tolerate waterlogged soil, even for a short period.

Frosts and the accompanying thaws are advantageous on heavy clay soils in that they break a cloddy condition down to one of fine tilth. For that reason it is desirable to dig such soils in late autumn or winter and leave them without further cultivation until they are required in spring. However, such a breaking up or loosening effect is not always an advantage to newly planted shrubs, for it tends to loosen the soil about the roots and cause "heaving." In such cases the soil should be trodden down after each series of frosts. Failure to do this may result in frost damage to root tissues and subsequent rotting.

Gladioli may be planted now in the milder northern districts. It is still too early to plant flowering-sized corms in most other parts of the Dominion, but cormlets may be planted now to allow them the longest possible growing season. They should be sown 1 to 2in. apart and about 1½in. deep.

Greenhouse plants such as gloxinias, streptocarpus, cyclamen, and tuberous begonias can be propagated from seed sown in July. The boxes or trays should be filled to within an inch of the top with a finely sieved compost, thoroughly watered from a fine rose. The seed is sown thinly over the surface, and if it is covered with soil at all, a very light and finely sieved layer is sufficient. Darkness and a humid atmosphere are desirable for seed germination and are best attained

[*Sparrow Industrial Pictures Ltd. photo.*

Seed-beds against the northern wall of a building are splendid for raising seedlings.

by placing a sheet of glass over the seedbox and covering it with brown paper. The boxes should be inspected frequently, and as soon as the seedlings have appeared the glass and the paper must be removed; otherwise the small plants will become drawn.

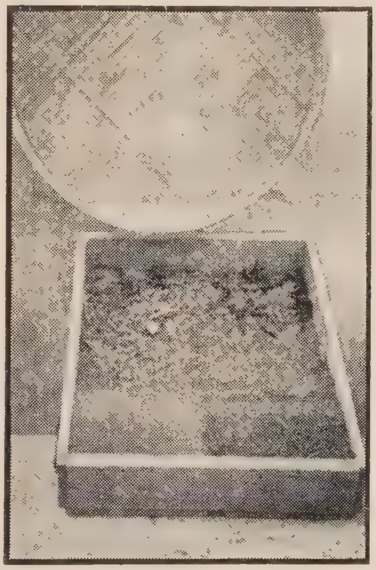
Iceland poppies should be inspected regularly from now on for symptoms of the virus disease known as spotted wilt. Infected plants never recover and are best removed from the soil with a trowel and burnt. To reduce to a minimum the risk of spreading the disease the hands should be washed thoroughly after tending infected plants before handling healthy ones.

Japanese irises (*Iris laevigata*) are fibrous rooted and may be divided and replanted during July. They need a soil rich in organic matter which is moist all year round, but not waterlogged or boggy.

Shrubs which flower on the current season's wood can be pruned now by cutting back to within a few inches of the older stems most of the shoots which flowered during the previous season. This treatment, administered annually, ensures a constant supply of new flowering shoots and prevents the shrubs from becoming straggly. A few of the shrubs which should be pruned thus are *Ceanothus* Gloire de Versailles, *Spiraea japonica* var. Anthony Waterer, and *Buddleia variabilis.*

Roses may be pruned now in all but the coldest districts, where frost may kill any induced new growth or the ends of pruned branches, thus ruining the shape of the bush. The subject was dealt with in detail in an article by R. I. June in last month's "Journal."

Bedding plants: Seed of quite a number of plants suitable for bedding displays should be sown under glass in July. Among these are antirrhinums, *Verbena venosa,* calendulas, lobelias, East Lothian stock, nemesia, *Torenia fourneri,* and *Phlox drummondi.* The method of sowing is similar to that outlined for greenhouse plants except that the compost need not be so fine and the seed should be more heavily covered.



In the preparation of a seed-box coarse soil is placed at the bottom of the box to permit drainage and finely sieved soil is used at the top for seed sowing.

Sweet pea seedlings raised from seed sown in June or earlier and germinated in a frame or greenhouse should now be gradually hardened off by giving them more air and less protection. They may be planted out in the milder districts, 15in. apart if they are to be grown for exhibition blooms and 4 to 6in. apart for mass display.

Other Work for the Month

Thin to 8 to 9in. apart **annuals** sown in the borders in autumn.

Continue planting out **bedding plants** in the milder districts.

Take cuttings of **perpetual flowering carnations** under glass.

Remove dead fronds from **ferns** and spread a layer of compost over the roots.

Plant hardy herbaceous **perennials** such as helenium, rudbeckia, kniphofia (red-hot poker), and gaillardia.

Care is necessary not to overwater **pot plants** at this time of year. They do not take up much water during winter and become waterlogged readily.

If the soil is wet and cold when **trees and shrubs** arrive from the nurseryman, they should be heeled in until better conditions for planting return.

1

A NOTICEABLE feature of present fashions is the ever-increasing popularity of wool as a medium for the creative genius of the world's premier dress designers, particularly in Paris, as French woollens are famous for their fineness of weave and their fanciful delicacy of pattern. Indeed, it has long been a practice of the woollen manufacturers in France to submit samples of the loveliest products of their looms to the leading couturiers of their country, such as Christian Dior and Jacques Fath, who select the fabrics most suited to the mode they have in mind and so set the fashion for the following season. Students at the noted Parisian school sponsored by the Association of French Dress Designers always begin their course with a lesson on wool materials and their manner of treatment.

2

New Zealand Designs in Modern Wool Fabrics

RECENT models in wool imported by the New Zealand Wool Board from the leading fashion houses of Paris and London were worn by a group of mannequins at a special display in Wellington at which New Zealand designers also had the opportunity of demonstrating their ability in handling modern wool fabrics. The parade proper was prefaced by a pageantry of period costumes in wool as an illustration of the importance of this commodity in the progress of mankind down the centuries.

* * *

Outstanding among the overseas creations is the Rita Roberts negligee of wool lace shown on the opposite page—white as a mesh of sea foam, faery-fine as the filmiest gossamer. Styled with a shawl collar and flowing sleeves, it is fastened at the waistline by six small spherical buttons of crystal similar in shape to the blossoms shown to advantage on the full skirt, which has inset panels patterned with single cosmos after the manner of Venetian point lace. To give the wool the strength needed for the weaving processes a carrier thread of alginate rayon—a derivative of seaweed—is introduced; this thread is washed out of the completed fabric with soap and water, leaving only the gossamer-like wool lace.

The evening dress in the New Zealand collection (1) is the work of a young Wellington designer, Douglas Olifent, and is poetically titled "Sombre Music". His subtle draping of wool in the new shade known as sea-mist blue gives this formal gown a slightly Edwardian air, especially in its back view, the material being caught up in the merest hint of a bustle. The sculptured ripples of the wide apron drape are repeated in miniature at the base of the square-cut neckline, where two clips emit a frosty glitter as of moonlight on waves.

* * *

Olifent is equally happy in his handling of wool for day wear, as witness his attractive two-tone suit with its fine-pleated skirt in deep teal green (2). Horizontal stripes of the same dark toning add distinction to the light green jumper top, and the cuffs on the three-quarter sleeves and the decorative detail of the arrowhead pocket are also in dark teal.

A profusion of knife pleats is the chief style point of the dressmaker suit by another New Zealand designer (3). The slim-fitting jacket is simplicity itself, its sole ornamentation being the gleaming gilt buttons down the front. This burnt-sugar brown two-piece lends itself particularly to the high, off-the-face type of headwear, with its halo brim edged with a mist of veiling and trimmed with a huge taffeta ribbon bow at one side, and is the perfect suit to wear with furs.

* * *

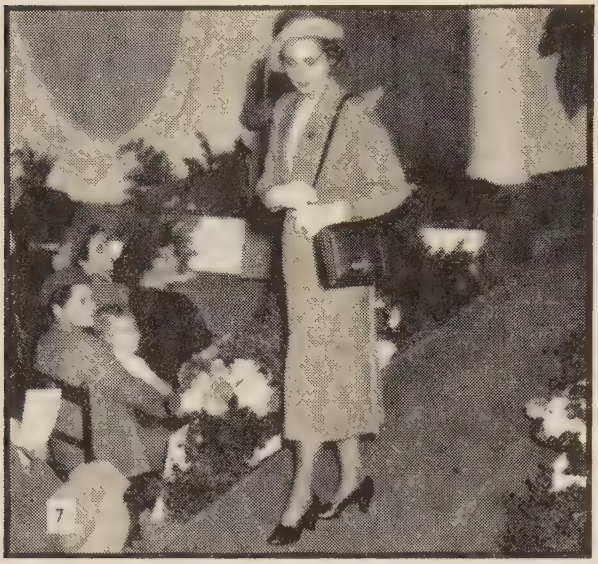
For the woman who prefers the tailored type of suit there is a new version of the double-breasted mode in a pin-head blue tweed (4), the coat fastening high in front and cut away at the bottom waistcoat fashion. The loose shoulderline gives ease of movement, and the skirt has tailored folds at the back for comfort and holds its shape when its wearer sits down. The blue note is accentuated further by the becoming chou of ribbon adorning the rolled hatbrim and the narrow stripe in the straight-handled, silk tartan umbrella.

The little black dress which is a "must" in milady's wardrobe comes in for fresh cherishing when carried out in black and white wool checks (5). Cuffed and collared in self material, its smartness of cut conforms closely to the pattern of the fabric, which has been used in diagonal insets to concentrate interest on the skirt. Additional emphasis on black is obtained by the broad suede belt and beribboned cloche. Gloves and court shoes are also black.

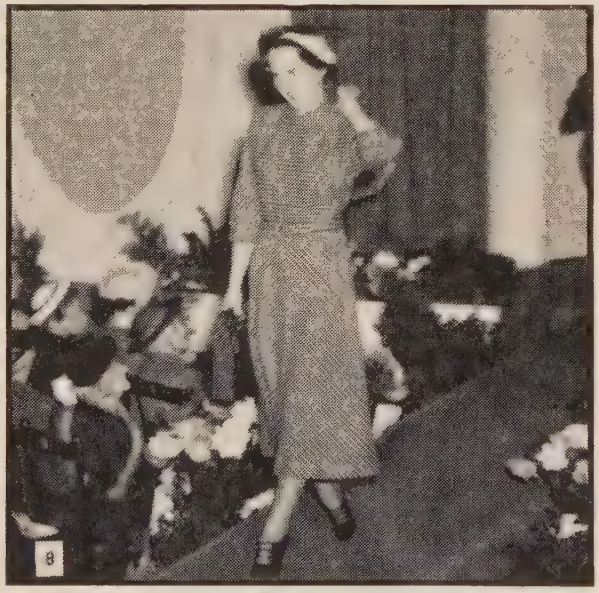
* * *

The impeccably cut afternoon frock in wool jersey (6) is vibrant with colour, being a rich cherry red which would bring a glow to the coldest day. The neckline is unusual, the winged collar cleaving a deep V in the circular yoke. Fly tacks in french grey suavely stress the flowing lines of the long-waisted bodice, the new swing-out pleats in the skirt flaring into fullness from the hipline. A short grey coat completes the ensemble.

NEW ZEALAND DESIGNS IN WOOL



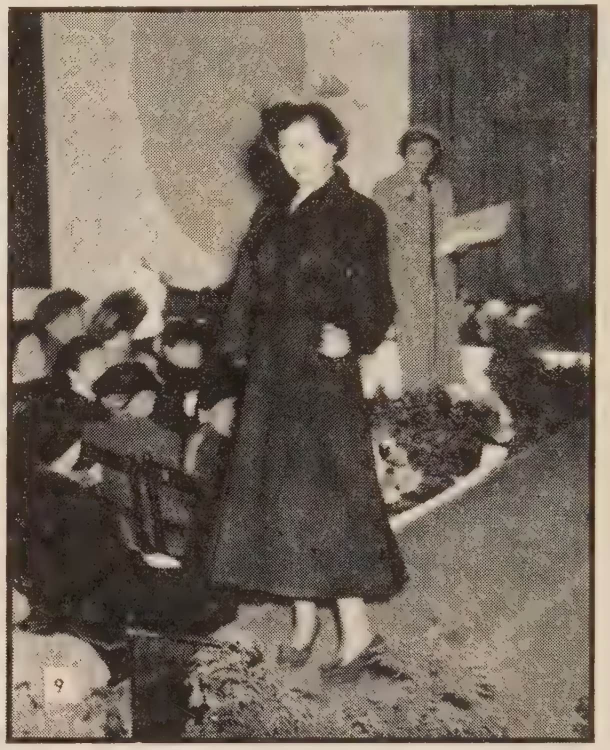
Accessories are all-important with the classic tailleur in dove-grey wool gaberdine (7). Side pleats bestow the necessary width for walking without in any way spoiling the slender silhouette, and the sleeve buttons and the strategically placed pockets show an almost masculine severity which is softened by the essentially feminine touches of a primrose yellow jersey and hand-knitted gloves. Court shoes and capacious shoulder-bag are of brown calf, the bag's circular clasp matching the gold fob and ear-rings. With a basic suit such as this blouses can be a froth of lace or pintucked georgette, plainly tailored silk, or polka-dot linen. Candy-striped taffeta makes an attractive change, and a finely ribbed sweater with a collarette of pearls imparts warmth as well as elegance when winds are chill. Clear colours like turquoise, coral, daffodil, dusty rose, and all the fascinating petunia tonings take on a new significance when teamed with grey. Hats, of course, should vary with the time, the mood, and the occasion. A bright boutonniere in place of a jewelled pin or other lapel ornament is a gay notion, and changes of scarves, shoes, gloves, and handbags all play an important part in these "variations on a theme".



The zephyr-striped dress in wine and mushroom wool jersey (8) provides a perfect answer to the problem of travel wear. The skilful arrangement of stripes in the four-gored skirt, slit pockets, and sleeve bands contributes to the trimness of this charming shirt-maker style. The loose-fitting commander coat which accompanies it combines casualness with chic and is of the same mushroom pink shade as the provocative felt beret with its colourful coq's feathers. Gloves, triple-strapped shoes, and fitted make-up case are in wine toning.

* * *

Fashion high lights of the flattering coat in beech-nut brown face cloth (9) are the fly-away scarf, which can be worn floating panel-wise from beneath the plain collar or flung nonchalantly over one shoulder according to the wearer's fancy, and the sleek-skirted effect enhanced by buttons set all the way down the sides. The little leaf-shaped hat of old-gold felt has an engaging bow trimming high on the crown, and bows perch like butterflies on brown peep-toe shoes.



Their models in wool show that New Zealand dress designers have a lively appreciation of line and a gift for artistic detail which is the essence of good design. Moreover, the range of wool fabrics (many of them woven from wool produced in this country) is increasing month by month. Gaberdine in beige and sand grey is still a favourite for women's suits, and wool jersey is ever popular because it drapes gracefully and comes in many exquisite colours, varying from the delicate pastels of spring flowers to the most dramatic shades in the spectrum.

New fine-weight woollens are constantly coming on to the market, the latest featuring a fine-ribbed effect, names such as ribilaine, strathcord, channelcord, and travelcord being descriptive of this type of material. The heavier kinds of pile cloth are represented by mohair, brushed wool, astrakhan, and curlaska, the short-curled cloth which makes up well for evening coats and has the added merit of being much less expensive than fur.

Though far from the world's foremost fashion centres, New Zealand women are fortunate in having not only a wealth of beautiful wool materials from which to choose but competent designers in the Dominion to create the clothes of their dreams.

Flaky Pastry Made with Compressed Yeast

By EVA TOPPING, Rural Sociologist,
Department of Agriculture, Auckland.

TENDER, flaky, crisp, golden-brown pastry for afternoon teas, suppers, and desserts made with compressed yeast and freshly baked is an appetising departure from the usual fare. Some cooks are diffident about their success with yeast recipes; some hesitate to attempt puff pastry. Yeast pastry will appeal to them, as it is easy to make and success is certain if a few simple steps are followed. Yeast pastry originated in Europe and is often called Danish pastry.

FIRST, a rich yeast dough is set and when it has risen sufficiently, additional fat is rolled into it, in much the same way as the usual puff pastry is made.

Recipe for Dough

1 cup of scalded milk
1oz. of compressed yeast
2 eggs
¼ teaspoon of vanilla flavouring
½ flat teaspoon of grated nutmeg
3½ to 4 cups of flour
3 tablespoons of lukewarm water
4 flat tablespoons of sugar
½ teaspoon of lemon flavouring
2 tablespoons of lard (or butter)
Pinch of salt

Put the yeast into a cup or small basin with the lukewarm water and leave it to stand for 10 to 15 minutes. Heat the milk. Put the sugar, salt, and lard in a large bowl and pour the hot milk over them, stirring until the fat is melted. Cool the liquid until it is lukewarm and add the eggs while beating the mixture slightly. Stir up the yeast and add it to the mixture; next add the flavourings and nutmeg. Add 3 cups of flour and stir until the ingredients are smooth, then add enough of the remaining flour to make a soft ball of dough. Sprinkle the top with flour, cover the bowl, and set it aside in a warm place until the dough has doubled in size.

Adding the Fat

When the dough has risen sufficiently roll it out on a floured board to form a rough square about ¼in. thick. Take 1 cup of softened fat (lard or butter) and dot half of it over the dough, leaving a narrow border. Fold the dough in halves and press the edges together. Dot the remainder of the fat over the dough, leaving a border. Fold in halves in the opposite direction to the first fold and press the edges together.

Folding, Rolling, and Setting to Rise

Roll the dough into a square about 1/3in. thick; fold in halves, then fold again crosswise. Repeat this folding and rolling three more times.

Next place the folded pastry in a greased bowl, cover it, and set it aside for about 20 minutes. It is then ready to use for sweet flans and pies, or for plain, filled, or decorated small pastries.

Shaping the Pastries

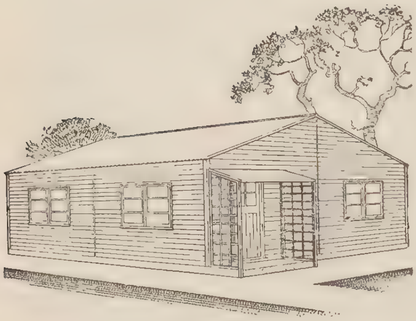
Small pastries for the tea table can be cut and folded in many different ways, according to personal fancy; here are some suggestions for shapes:—

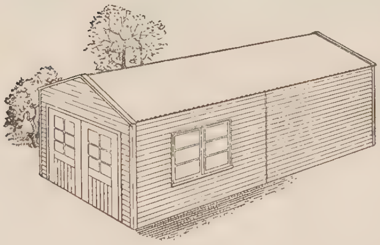
Figure eights, rings, and coils: Roll the dough 1/3in. thick and cut strips ¾in. wide and about 8in. long. Hold one end down and twist the other. Form into figure eight, having both cut ends in the middle of the figure. Make the strip slightly shorter than 8in. for a ring and slightly longer for a coil. Press the loose ends into the shapes.

Braids: Cut a rectangle of dough about 9in. long and 3in. wide. Cut it into 3 strips, leaving them just joined at one end. Plait the 3 strips and pinch them together at each end. Cut across the middle and pinch the cut edges together, making 2 small braids.

HEADING PHOTOGRAPH: Small pastries in fancy shapes: Coils, fold-overs, figure eights, braids, rings, and folded stars. Sparrow Industrial Pictures Ltd. photo.

PREFABRICATED BUILDINGS





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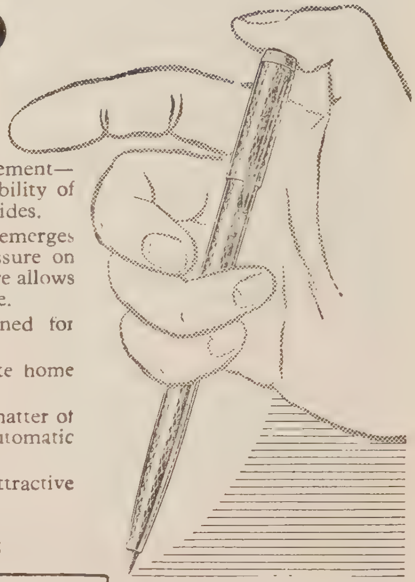

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If you are past middle age, or your skin is ageing, avoid long exposure to the sun's rays. As you age, moderate your sun-bathing.

See that your workplace is clean and well ventilated. Persistent breathing in of smoke, dust, dirt, benzine exhaust fumes, or acrid industrial fumes, should be avoided.

Be moderate if a smoker. Excessive smoking burns the tongue, cheek and lips.

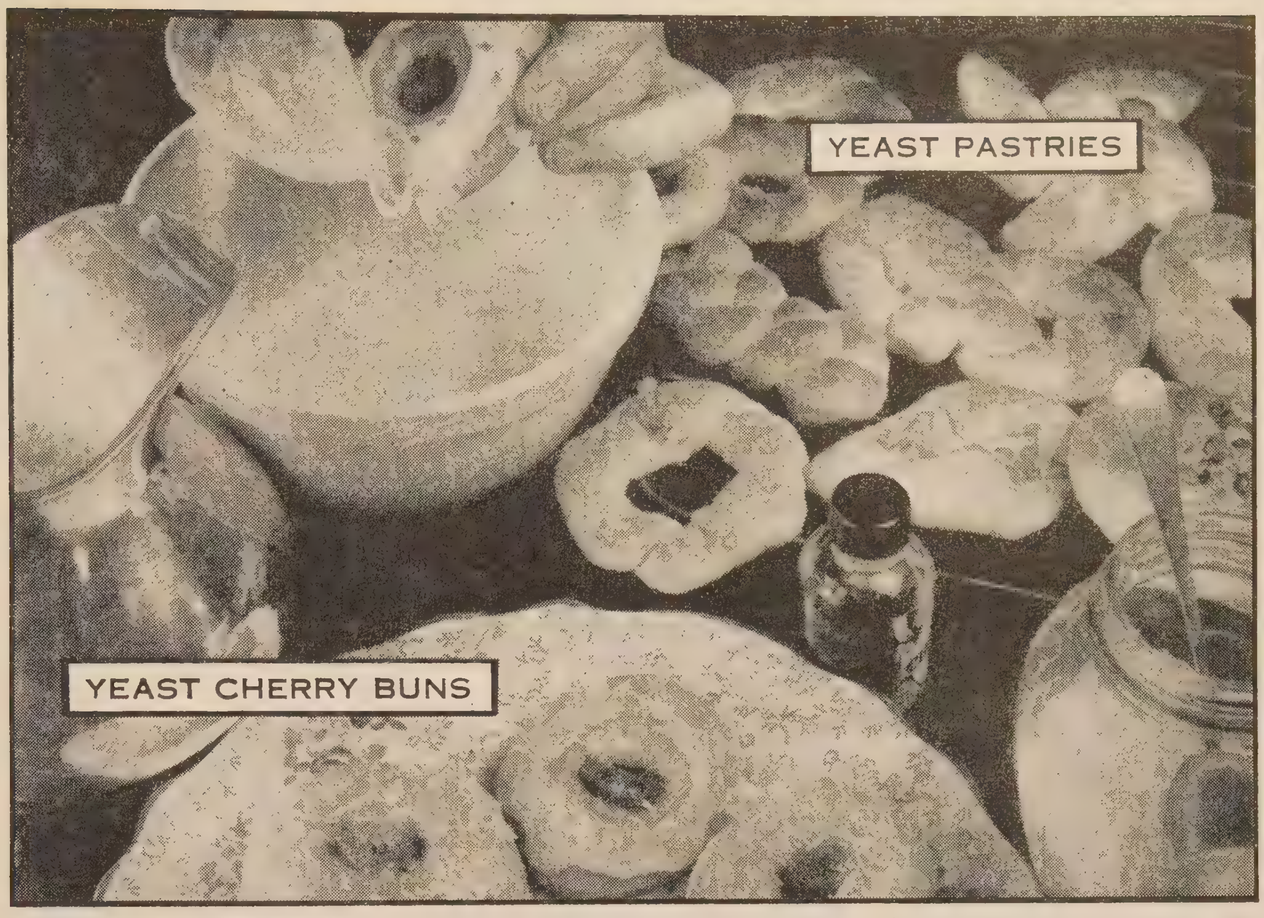
Cut out the drinking of very hot tea, or soup, or other very hot drinks. They irritate the gullet and stomach.

Relax at meal times. Strain, worry and hurry with meals, tends to stomach ulcers. They leave scars or chronically irritated areas that may become cancerous. If tired out, eat small meals or wait and rest before eating. Don't eat a big meal when exhausted.

Have any sharp teeth or badly fitting dentures seen to. They cause long-standing mechanical irritations.

If in doubt, remember your medical practitioner is the first line of defence against CANCER

ISSUED BY THE NEW ZEALAND DEPT. OF HEALTH 4.9



[*Sparrow Industrial Pictures Ltd. photo.*

Fold-overs: Cut the 1/3in.-thick dough into 3in. squares. Take up two opposite corners and bring them to the centre to overlap slightly.

Folded stars: Take 3in. squares of pastry and make cuts from the corners almost to the centre. Fold alternate points to the middle and press them down.

Last Rising and Baking

Put the pastries on a greased baking sheet and set them aside to rise again until they have increased in bulk by one half. Then bake them in a very hot oven (480 to 500 degrees F.) for 8 to 10 minutes or until golden brown.

For decoration, brush the pastries just before baking them with a glaze made of beaten egg and 2 tablespoons of sugar and then sprinkle them with chopped nuts; walnuts or blanched almonds chopped finely are best, though roasted peanuts or cashew-nuts can be used.

Another glaze is made by boiling 2 tablespoons of golden syrup or honey with 2 tablespoons of butter for 3 minutes. This is brushed on to the pastries after they are baked and while they are still warm.

A thin, white icing (1/3 cup of icing sugar mixed with 1 teaspoon of water) can be dripped on to the cooled pastries instead of brushing them with a glaze. If desired, icing can be flavoured with vanilla, almond, or lemon essence, but the amount of water used in the icing should be reduced proportionally according to quantity of flavouring added.

For variety small pastries can be filled with jam, lemon cheese, sweet mincemeat, or one of the following:—

Almond filling: Cream together ¼ cup of butter and ¼ cup of sugar. Add an egg, ½ cup of almond paste, and ¾ teaspoon of almond essence. Mix until thoroughly blended.

Apricot filling: Put 1 cup of cooked apricot pulp in a saucepan with 1 teaspoon of lemon juice. Cook gently until thickened. Add a few pieces of blanched, chopped almonds.

Prune filling: Take ½ cup of cooked, stoned prunes, 2 tablespoons of sugar, 1 teaspoon of lemon juice, and ¼ teaspoon of ground cinnamon. Combine these ingredients in a small saucepan and simmer them gently until the filling is thick enough to drop heavily from a spoon. Stir the mixture continually or it will burn

Sweet Pies or Flans

To use the pastry for jam or fruit flan roll it out to ¼in. to 1/3in. thick. Line a pie plate or sandwich tin and fill it with jam or cooked fruit pulp. Bake in a hot oven (450 degrees F.) for 20 to 30 minutes or until the pastry is golden brown. To get extra flakiness the unfilled pie shell can be left to rise a little before filling and baking are done, but this extra rising is optional. Sweet pies or flans should not have a top crust, but they may be decorated with cut-outs or twisted strips of pastry.

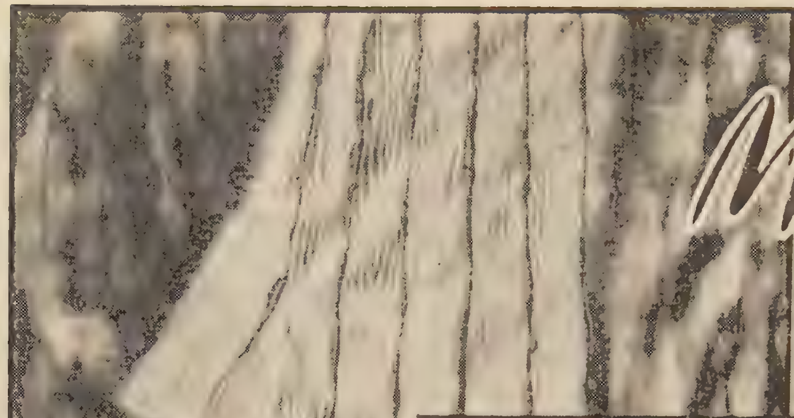
Cherry Buns

Small iced buns, especially good to serve with coffee, are made from the same dough as Danish pastry. Make dough according to the recipe already given and set it, then take a piece of the dough and roll it out to ½in. thick on a floured board. Cut rounds 2in. in diameter, place them on a greased baking sheet, and leave them to rise in a warm place until they have doubled in size.

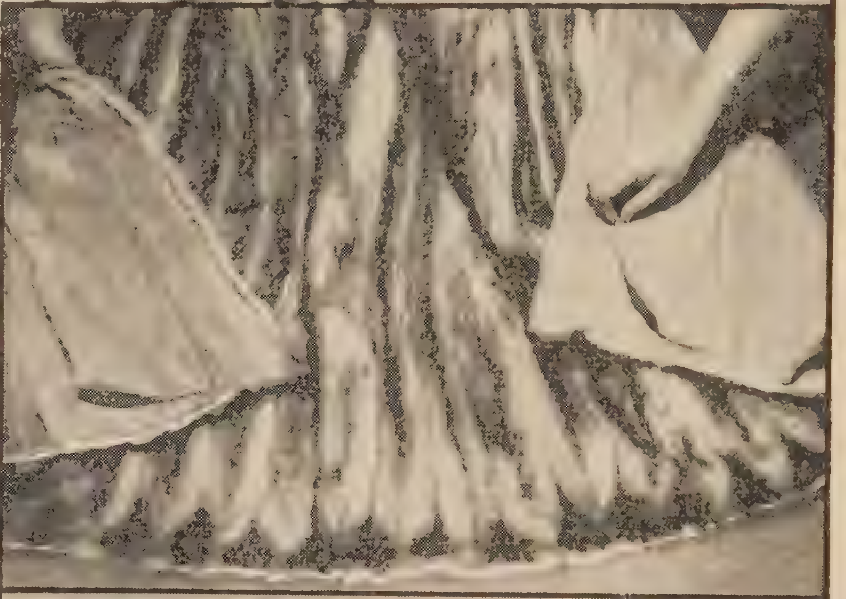
Press a deep indentation in the centre of each round and put a crystallised cherry in the hollow. Bake the buns in a moderate oven (350 degrees F.) for about 20 minutes.

Make a thin icing with 1 cup of icing sugar, 4 teaspoons of warm water (or milk), and a few drops of vanilla essence. Drip the icing over the baked buns while they are still warm and sprinkle it with desiccated coco-nut.

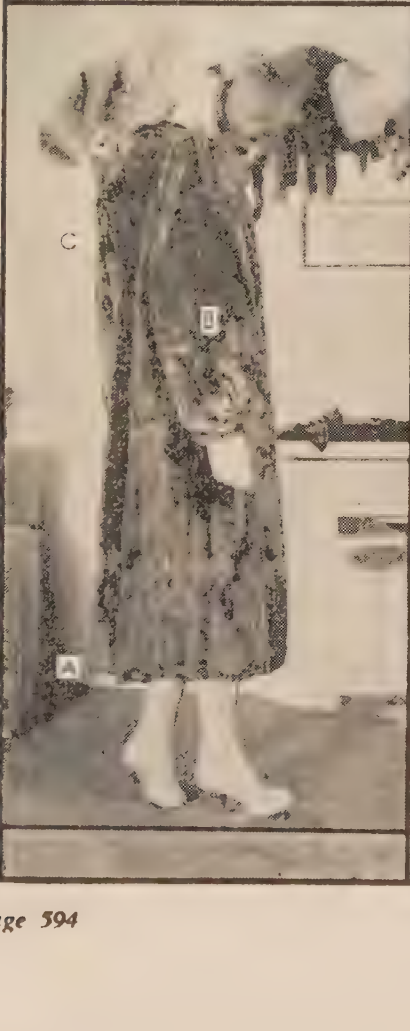
Making up Furs



Stages in manufacture. Above—The pelts seamed. Right—The coat taped and reinforced with canvas.



Left—Checking the coat on the model to ensure that the lining does not drag. The main points checked are the hem (A), sleeves (B), and centre back (C). Below—Putting in lining. D—Rolled wadding. E—Interlining.



[Sparrow Industrial Pictures Ltd. photos.

Choosing a Fur Coat

By NELL MACPHERSON, Rural Sociologist,
Department of Agriculture, Auckland.

ALTHOUGH furs, or rather skins, have been worn in cold climates as long as man has existed, few people know much about them. Many people can afford to buy only one or two fur coats in a lifetime and it is important therefore that to get good value they choose wisely. Fur coats are expensive and should last many years.

A GOOD furrier will advise customers as wisely as he is able and customers should avail themselves of the benefit of his specialised knowledge. Hasty decisions should be avoided and the various points should be considered carefully. A good fur coat should fulfil the following requirements:—

It should be of good-quality fur.

It should be well made (if the workmanship is poor the quality of the fur will not compensate for it).

It should be of durable (if properly cared for) fur.

It should fit properly.

It should suit the wearer both as to type of fur and style

Today it is difficult to tell from what animal the fur came, because cheap skins may be treated in various ways to give them the appearance of more expensive furs. The name of the original fur must, according to law, be stated on the label. Among the furs at present available in New Zealand are rabbit (also known as coney and lapin), marmot, marten, musquash (or muskrat), squirrel, nutria, beaver, fox, opossum, fitch, pony, calf, and the various lambs.

Types of Furs

Among the most expensive furs are chinchilla, mink, marten, and Russian sable; beaver, blue fox, Alaska seal, most types of lamb, kolinsky, and leopard are fairly expensive; badger, fitch, most foxes, skunk, mole, muskrat, ocelot, raccoon, squirrel, and others are less expensive; while low-priced furs include hare, marmot, plasticised lamb (sheepskin treated with resinous material), pony, calf, and rabbit. Furs are classified according to the length of the hair and according to normal expectation of wear. The latter, of course, depends to some extent on the care given the fur. No garment, whatever its composition, will withstand ill-treatment, and the term "normal expectation of wear" assumes that the fur will be given reasonable care.

Fox, fitch, and opossum are long-haired furs; musquash, squirrel, nutria, beaver, and rabbit are shorter furs; marten, seal, leopard, antelope, calf, and pony are short or flat furs; and the various lambs such as Persian, broadtail, caracul, and krimmer are curly furs.

Hard-wearing furs include badger, beaver, fitch, marten, plasticised lamb, Persian lamb with a high lustre and well-developed curl, Alaska seal, and muskrat; moderately hard-wearing furs, broadtail, fox, krimmer, nutria, opossum, pony, marmot, squirrel, calf, and some martens; and poor-wearing furs, leopard, hare, some lambs, and most rabbits.

Individual pelts of any species vary greatly; they may be coarse or fine, luxuriant or sparse, lustrous or dull. Climate, diet, and heredity affect the quality of the fur. Cold climates produce luxuriant fur, and good diet lustre; markings and colours are hereditary. Some of the best fox furs now come from pedigree-fox farms, and mink is now being produced in much the same way, but wild animals produce the softest and most luxuriant furs.

Quality Points

There are separate standards for each type of fur, but, with regard to quality, the following points apply to all furs:—

1. Old skins are inferior because with age the pelt dries out and tends to crack.

2. Luxuriance of hair or fur is desirable

[Sparrow Industrial Pictures Ltd. photo.

3. The smoother and finer the texture the better the fur.

4. Dyed long-haired furs are inferior to natural ones, as dyeing tends to make the hairs brittle and also makes the pelt less supple. The extent to which the fur is affected depends on workmanship.

5. The paws are inferior to the rest of the pelt.

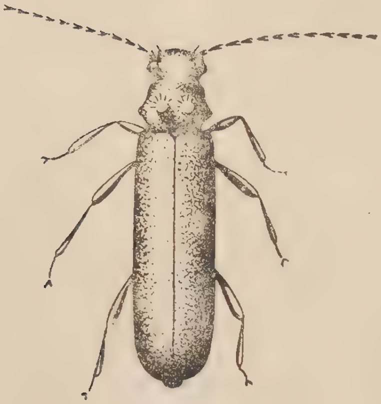
6. Quality varies according to the degree of care taken in matching skins. In good-quality garments colour, flow, thickness, and length of fur are so matched that the garment appears to be one piece.

7. Collars of perishable furs should be set back from the neck to protect the fur from wear.

Unless a fur coat is well cut and well made it will never look well on or wear well. In a well-made coat good skins will be used under the arms and sleeves and for facings. The lining should be of good quality and be strong enough to support the weight of the coat.

Usually it is wiser to buy a cheaper fur of good quality which has been properly handled than an expensive type of fur that is of poor quality. It is also better to buy a conventional or classic style of coat than an ultra-fashionable one, as fashion changes quickly and it is expensive to have a coat remodelled. When the same coat is to be used for day and evening wear a three-quarter length coat is often best. It suits clothes for both occasions and does not "seat" to the same extent as a full-length coat. If a ready-made

6d each
paid for these
BORER
BEETLES



Note prominent hump on each side of head with large swelling on top . . .

TWO-TOOTHED LONGHORN

(AMBEODONTUS TRISTIS—do not confuse with lemon tree borer.)

DISTINGUISHING FEATURES:

The two-toothed longhorn beetle is ½″ to 1″ long and narrow bodied. Dark reddish colour with thin and irregular covering of fine short yellow hairs. Just below the head there is a broad conical spine sticking out each side. On top of each spine there is a shining round swelling. Minute warts cover the back. The head is pitted with numerous holes. Beetle exit holes from timber are oval and up to 1/3″ across the widest diameter.

Probably the most destructive borer in New Zealand. Life cycle is at least 5 years, possibly 12-15 years. Thus the 1″ long grubs have plenty of time in which to do damage. Burrows may extend many feet through joists, studs, flooring, wall boards, etc. without breaking surface. Beetles shun strong light and prefer to emerge on the underside of timber. SO LOOK UNDERNEATH THE HOUSE. Beetles frequent old macrocarpa stumps and are prevalent in houses built on old bush areas. No real research has been done in N.Z. on longhorn eradication and the Boracure Laboratory will pay 6d. each for the first 5,000 live beetles sent in, with a special price of £10 for the largest individual collection.

Beetles must be kept separated as they seize each others legs and antennae and won't let go. Pack in individual containers (preferably tins) or separated by several thicknesses of paper. Wrap securely and send to The Laboratory, Boracure (N.Z.) Ltd., P.O. Box 632, Wellington. State number of beetles sent, print your name and full address.

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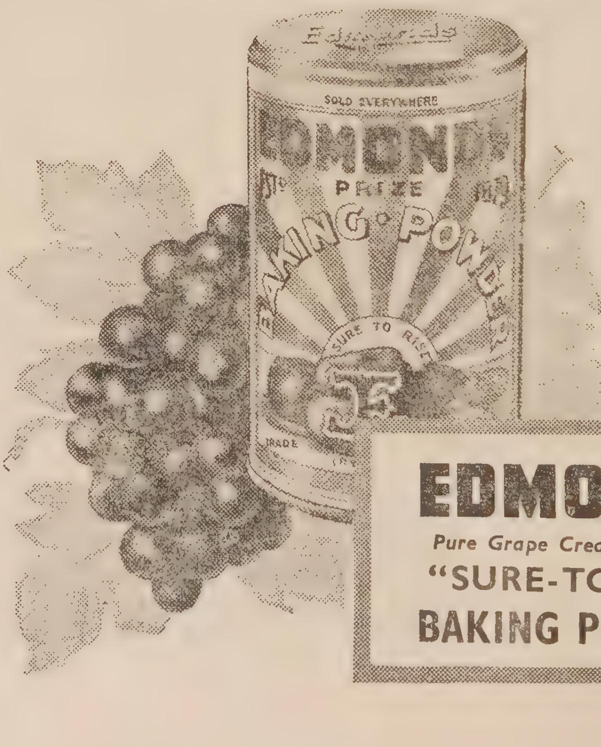

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coat is being bought, check the lining seams to see that they are properly finished and the joins of the pelts, which should be regular and even.

A coat should be one size larger than other clothes and it is wise to try it on over a suit. It should open and close as one walks unless it is a lap-over closing, when it should remain closed except when one is sitting. A fur coat is heavy and unless it is made so that the shoulders rather than the neck bear the weight, it will never be comfortable and may be very tiring to wear.

Technical Terms

There are some technical terms in workmanship which should be understood.

Spotting means applying spots with a brush or feather.

Pointing refers to the practice of glueing in white hairs to improve inferior silver fox furs.

Shearing: Sheared furs have had the long guard hairs removed.

Blending is skilful tinting or dyeing to enhance the appearance of a coat. It is very effective and durable when properly done.

Dyeing is not necessarily harmful, though it may make the pelt less supple. It can be detected by blowing into the fur and looking at the pelt, as a natural pelt is creamy white.

Stranding or letting out means cutting and sewing a pelt in such a way that it becomes longer and narrower than it was originally; it is done with mink and fitch.

Suitable Styles

Once one has decided to buy a fur coat and has set aside the approximate amount to be spent it is necessary to make a critical estimate of one's figure; there are styles which suit each type of figure, and by choosing wisely one may achieve distinction.

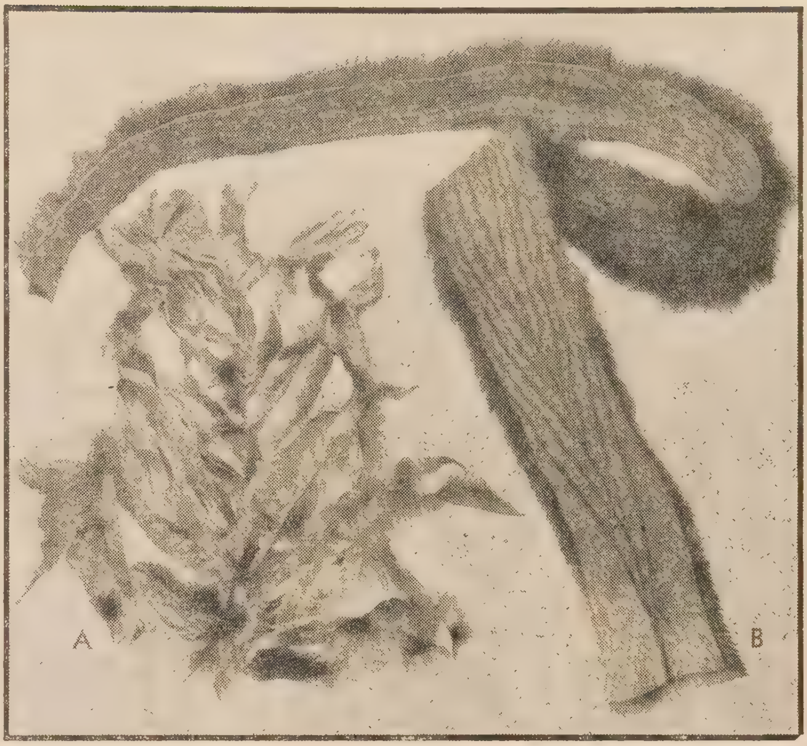
Figure types may be classed broadly as tall and slender, tall and stout, short and slender, short and stout, and angular.

Tall slender women can wear almost any fur well. Long-haired furs suit them and they can wear wide collars and scarves and similar horizontal lines.

Tall stout women are better suited by flat furs with long lines; long scarves worn vertically and stoles suit them.

Short slender women should keep their furs "toned down" to give a petite look. They should wear long lines to enhance slenderness and also wear medium or short furs. Long-haired furs and horizontal lines should be avoided. Fox scarves and capes will make short slender women look "top heavy."

Short stout women seldom look well in furs unless they are chosen to give length. It is important to wear short-haired or curly furs. Short stout women should never wear fur scarves or wide collars, as they tend to give the impression of the neck disappearing. Flat furs in narrow vertical bands are flattering.



[*Sparrow Industrial Pictures Ltd. photo.*
A skin cut for stranding (A) and sewn up after stranding (B).

Angular women are fortunate when it comes to choosing furs, as fur softens the figure and gives a more feminine look. These people may wear long-haired, bulky fur capes and collars and scarves. All long-haired furs look well on them, but opossum and the various foxes are particularly flattering.

Dark furs give a more slender appearance than light ones. Height is enhanced by vertical striping and seemingly decreased by chevron or horizontal striping. Two-coloured and spotted furs round out the figure.

Always remember that a fur draws attention and if unwisely used can accentuate bad points.

Care of Furs

Even the best furs, well chosen and well made, will not be attractive unless they are properly cared for. There are several points to watch.

1. Never hang the coat in the sun.

2. Watch the cuffs and sleeves for friction wear from handbags and parcels, and the collar for wear caused by head movements. Wearing a fur coat in a car tends to cause wear on the shoulders, elbows, and lower part of the back.

3. Avoid getting the fur wet, but if it should get wet, do not dry it in front of a fire or in a heated cupboard. Dry it in a cool, well-ventilated room. Brushing the coat, while it is still damp, with the flow of the fur helps to bring up the lustre.

4. Shake the fur fairly frequently to combat moths and brush it occasionally with the flow of the fur.

5. Hang the coat in a plastic bag if possible or in an uncrowded wardrobe. Attach small bags of moth repellant, such as some of the D.D.T. preparations, to the hanger and also pin them to the lining.

6. Keep the coat in good repair and occasionally take it to the furrier to have worn parts renewed.

Cleaning Furs

Furs should never be stored without first being cleaned to remove insect eggs, dirt, grease, and other foreign matter. Periodic cleaning will maintain the appearance and help to extend the useful life of the garment, as dirt and grease will possibly hasten decay, and insect eggs if allowed to incubate may produce harmful larvae.

As the cleaning of furs is skilled work, it is wisest to take the garment to the furrier from whom it was bought. If he is unable to clean it because of lack of facilities, he will know where to have it done.

When one has bought a fur coat and enjoyed the use of it it is wise to inquire from the furrier whether he provides a cool-storage service for summer. In New Zealand with its warm, rather humid climate and prevalence of moths, furs can deteriorate quickly in summer, and a cool-storage service is invaluable for those who like to wear good-quality clothes and take care of them.

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THE MUSEUMS OF NEW ZEALAND

EARLIER articles in this series by Enid B. V. Phillips have described twelve museums in New Zealand, eight of them being provincial or district museums. This month she deals with another provincial museum.

The Taranaki Museum

IN this air-minded age, when the miracles of modern transport have reduced the journey between the great metropolis which is the heart of the Empire and this, the most distant of the Dominions, to a matter of a few days, it is meet that New Zealanders should sometimes be reminded of the hardships and hazards their forebears had to face on the months-long trip by sailing ship from the Mother Country to the little-known Antipodes.

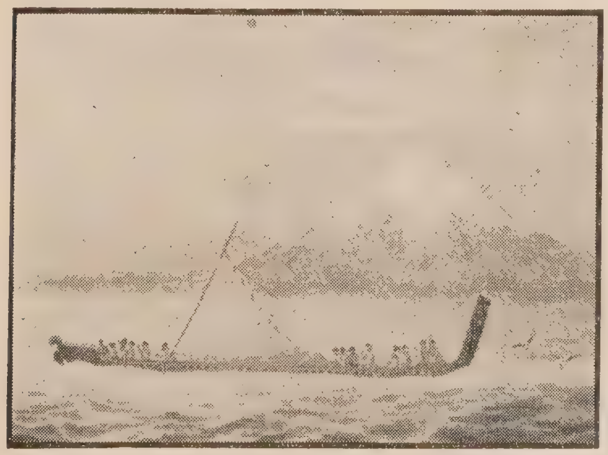
The deplorable overcrowding (as many as 200 people herded into a little 450- to 500-ton vessel was quite commonplace); the consequent lack of privacy (for example, the quarters for married couples and their families often consisted of one big compartment lined with bunks, the curtains of which afforded the sole means of seclusion for the occupants); the monotony of the food and the inadequate storage of pure drinking water (not all captains were as considerate as the master of the Amelia Thompson, who put into a South American port expressly for the purpose of giving the passengers a supply of water for washing their clothes and supplementing their provisions with fresh fruit and vegetables; nor was it feasible for every ship to divert its course so); to these and sundry other discomforts were added the dangers of sickness, storm, and shipwreck.

An account of one voyage mentions that nearly all the children contracted scarlet fever, but happily they all recovered. A traveller aboard another ship comments on the prevalence of dysentery and emaciation among the youngsters, and the surgeon of a third vessel records in his diary that he had ordered some bucketfuls of gruel and brandy for the females, many of whom had taken nothing since embarking 11 days before. In the same entry he laments the mortality among the poultry, 16 dead that day!

Bonus for Births

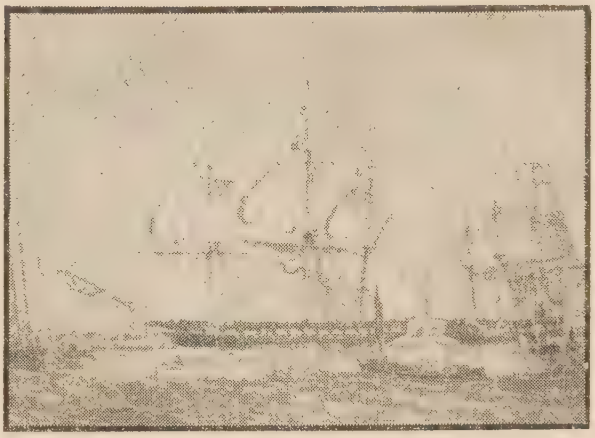
One ship's surgeon had an arrangement with the New Zealand Company whereby he received a fee for every passenger safely landed in New Zealand. Double the sum allowed for an adult was deducted in the event of a death, a birth bringing him in a bonus of the same amount. Fortunately the births were slightly in the majority, so the medico was not out of pocket.

Even when a vessel had had a good run there was always the risk of destruction at the journey's end. A sudden gale caused the Oriental at Port Nicholson on one occasion to drag her anchor and drove her perilously close to the rocks bordering the bay which bears her name. A similar experience befell her at New Plymouth, her final port of call, when the storm was so severe that she had to slip her cables and negotiate a narrow passage between two treacherous reefs to put to sea.



[From the Alexander Turnbull Library photograph collection.

This early picture of a Maori canoe off the Taranaki coast appeared as an illustration in Angas's "The New Zealanders Illustrated" (1847).



[From the Alexander Turnbull Library photograph collection

The Taranaki Museum has an extensive collection of paintings, sketches, and maps of early New Plymouth and Taranaki Province. This picture shows the New Plymouth roadstead in 1842.

The Amelia Thompson likewise had much difficulty in landing her passengers at New Plymouth owing to heavy storms, and several times while she was discharging cargo the violence of the gale forced her to leave the roadstead for the safety of the open sea. It was not until she was engaged as a transport on the Eastern run during the China War and had been beached for cleaning that her captain discovered the far greater peril besetting her from a broken back. On notifying the insurance company of the disastrous state of his ship he was greeted with the astounding information that the accident had occurred at her launching. Luckily for the conscientious captain and his crew the quarter-boats proved seaworthy when the barque sank soon afterward off the coast of Madras.

The journal written by John Newland, one of the passengers on the ill-fated Amelia Thompson during her voyage to New Zealand, is on view today in the early colonial section of the Taranaki Museum. The greatest single contributor of books, pictures, and MSS. to the museum was the late William Henry Skinner, whose mother came out to New Zealand as a young girl with her parents and other members of her family on this same vessel. His father arrived by the Oriental, the third ship bringing immigrants bound for the New Plymouth settlement.

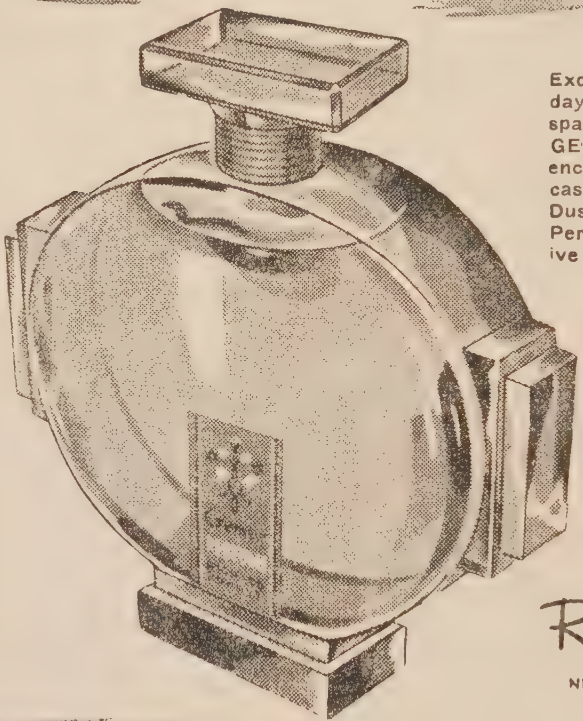
Childhood Memories of Maori Wars

William Skinner's childhood memories were dominated by the colourful mosaic of the Maori Wars, and at a comparatively early age he held a commission in the volunteers, the document bearing the signature of Sir George Grey. When as a 16-year-old he joined the Provincial Survey Department he not only had to provide his own horse and equipment, but had to pay an indenture fee of £80 as well. Moreover, the work was exceedingly rigorous, much of it being done in hitherto unexplored territory without even as much as a tent provided by the Provincial Government as shelter, and his survey parties, whose members consisted of Maoris, some of whom but a short time before had been enemies of the Crown, were responsible for cutting the tracks in the heavily afforested regions in the vicinity of Mt. Egmont.

Despite the bitterness arising from the confiscation of Maori land and the fact that he was engaged in surveying it as an essential preliminary to its sale, his survey party was always a happy one, and some of his closest friends were Maoris, among them being the noted leader Wiremu

Gemey

PERFUME



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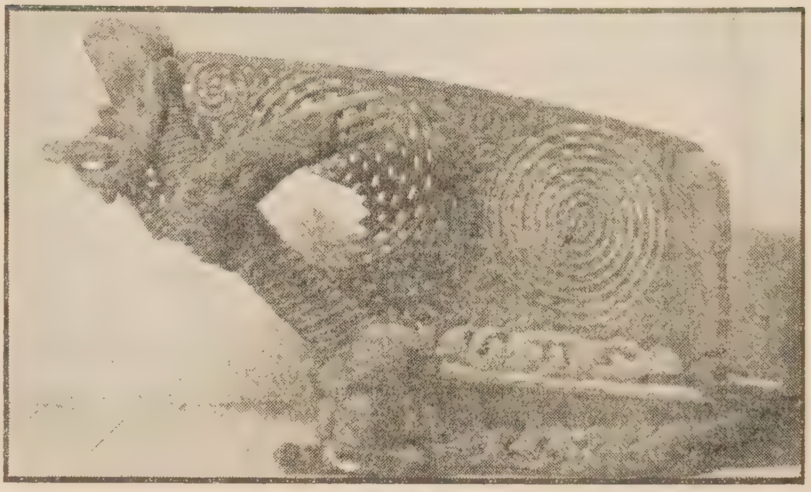


[*Brandon photo.*

The figure-head of the war canoe of the noted Taranaki chief Wiremu Kingi Matakatea, which was brought back to Waitara from Waikanae in the 1840's. This is considered one of the finest pieces of canoe carving in existence.

Kingi Matakatea. It was this Taranaki chief whose intervention saved the lives of the passengers and crew of the Lord Worsley, wrecked in enemy territory near Opunake in 1862, the survivors being conveyed to New Plymouth by bullock carts in the charge of Maori drivers. William Skinner, 5½ years old at the time was one of the cluster of children gathered on the beach to watch the drays arrive.

Enthusiasm for Simple Life

During the early years of his marriage William Skinner's wife frequently accompanied him on his field trips, "lightening the monotony of camp existence with practical if limited economy." She remained undaunted when wild dogs attacked the camp in the darkness and the men's carbines came into action to drive them off, and she did not show the slightest sign of fear when, travelling downstream amid the rapids of the upper Waitara, the canoe struck a rock and swayed in the direction of a swift-running current which threatened to sweep it towards a steep cliff with a menacing kopua (waterhole) at its foot, then swung over to the opposite side, balancing there precariously for a moment before it slid off the rock into smoother water. Even the predicament of having to be pick-a-backed out from camp after heavy rains had made the track impassable, the only possible route being through a flooded swamp liberally pitted with potholes and with only the stumps of the trees showing above the water, did not diminish her enthusiasm for the simple life.

Margaret Bracken Skinner, photographed at the time she accompanied her husband on his strenuous survey trips.

She was the first white woman to explore the upper reaches of the Waitara River, and a chief whose son had killed a visiting Englishwoman 2 years before not only extended his protection to the entire party, but presented Mrs. Skinner with three beautiful aurei (mat pins) exquisitely carved from whale's tooth ivory (these valuable tribal heirlooms now repose in the museum).

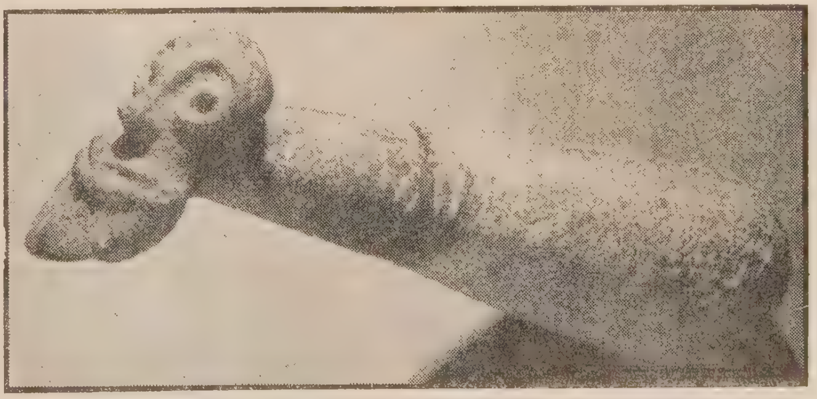
Margaret Bracken Skinner indeed merited the tribute which appeared in the obituary to her husband published in the "Journal of the Polynesian Society," 1946: "Few men are remarkable without remarkable wives and it is just to record the splendid qualities of the courageous and comely woman who shared his life even in those early surveying days when camp and bush life were strenuous enough for men."

William Skinner was highly competent professionally. In creating historic and scenic reserves he performed outstanding service to his native province, and in the same field he contributed something to the provinces of Marlborough, Hawkes Bay, and Canterbury, in all of which he later served as Commissioner of Crown Lands. He was a founder of the Polynesian Society, and at one time or another held every elective position in the society. For many years he was chairman of the committees of the New Plymouth Public Library and the Taranaki Museum, and of each he was a principal benefactor. When the first conference of New Zealand museums was held in Wellington in 1929 he was accorded the honour of being elected chairman.

Care of Sacred Anchor Stone

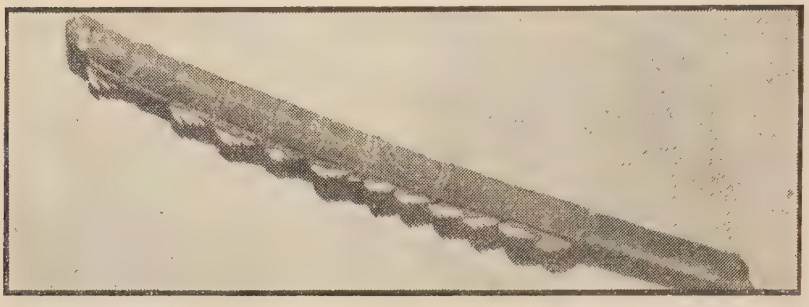
Furthermore, it was Wiremu Kina, as the Maoris called him, to whom the Mokau and Opunake tribes entrusted the safe keeping of the sacred anchor stone of the Tokomaru canoe, and on his recommendation this "historic memento of the old-time Polynesian navigators" was placed in the joint care of trustees appointed by the local tribes and the museum authorities.

The Taranaki Museum seems always to have been closely connected with the library. The date of its foundation is not recorded, but one notable exhibit, the finely carved pounder illustrated on this page, was found by William Devenish on his land at Mangaraka in the 1840's and cannot have been given to the local institute later than the 1850's. A good deal of older material formed a school museum at the New Plymouth High School and was transferred to the municipal chambers and library in 1900.



[*Brandon photo.*

The long stone pounder with a finely carved human head found by William Devenish at Mangaraka in the 1840's and presented to the local institute. It is one of the early exhibits of the Taranaki Museum, which began as a tiny collection from the Taranaki Institute.



[*Brandon photo.*

The shark-tooth knife given to the museum by F. A. Carrington, founder of Taranaki.

The present museum, which was opened on August 28, 1919, was erected by the New Plymouth Borough Council on the site adjoining the public library in King Street primarily to house the Skinner collection of early colonist material and the Maori relics and artifacts, donated to the borough by William Skinner and his son, now Director of the Otago Museum, Dunedin. Mr. John Baillie, the librarian, was appointed curator, and on his resignation in 1920 he was succeeded by Mr. E. B. Ellerm, now librarian at the Leys Institute, Auckland. The author Herries Beattie, well known for his books on early settlement in Otago and Southland and Maori traditional history in the South Island, was another who was curator at one time. Mr. G. W. Childerston is now in charge of the museum and early colonist collection under the direction of the librarian and curator, Mr. A. L. Low.

The museum has three sections—natural history, ethnography, and early colonial history. The first of these owes its existence to the late Clarice Douglas; it confines itself to the geology and fauna of Taranaki. The ethnographic section is devoted primarily to Taranaki, but has a small Polynesian and Melanesian display as well as comparative series from other New Zealand areas.

Pounders Unrivalled in Polynesia

The Taranaki material is of very high quality and is without rival in pieces carved from vesicular lava, including figures of the gods. The beautifully executed pounders, which seem to have been made in the country between the Mangaraka Stream and the Sugar Loaves, are unrivalled in Polynesia. Adzes, axes, and chisels are well represented, and there is a good series of greenstone pieces—adzes, chisels, meres, hei-tikis, and pendants. Flax mats are shown in some variety and there is a splendid dogskin mat, unique in that the skins have not been cut in strips, but are complete.

Examples of wood carving are not as numerous as could be wished when it is remembered that in pre-European times Taranaki developed a local style of decorative art second only to that of the Bay of Plenty region. Under the pressure of savage Waikato raids in the 1820's the whole Maori population of North Taranaki withdrew to the Wellington district between Port Nicholson and Waikanae, and all the house carvings except those concealed in swamps were burnt or lost by decay. Weapons, featherboxes, and small portable pieces were carried south, and carved canoes bore part of the migration.

In 1849, under promise of the pax Britannica, the tribes returned, bringing with them some canoes and those portable pieces which had not been parted with. But before the old decorative carving could be resumed the war between Maori and pakeha swept the district and there were heavy confiscations of land; Taranaki decorative carving consequently died out, a fate which did not befall wood carving in the Bay of Plenty region or on the east coast.

Therefore, of larger woodwork the Taranaki Museum has a few canoe carvings and some house carvings which have been found concealed in swamps. Among these is the figure-head of the waka taua (war canoe) of Wiremu Kingi, brought back from Waikanae in the 1840's and one of the finest pieces of canoe carving in existence. Retrieved in recent years from swamps is an interesting series of wooden bowls and a group of house carvings. Most of these house carvings, however, have gone to other museums.

Of smaller wooden pieces there is a good series of weapons, fish-hooks, and such pieces as the shark-tooth knife given long ago by F. A. Carrington, founder of Taranaki, and the small carved food vessel donated by the Samson family of Bell Block.

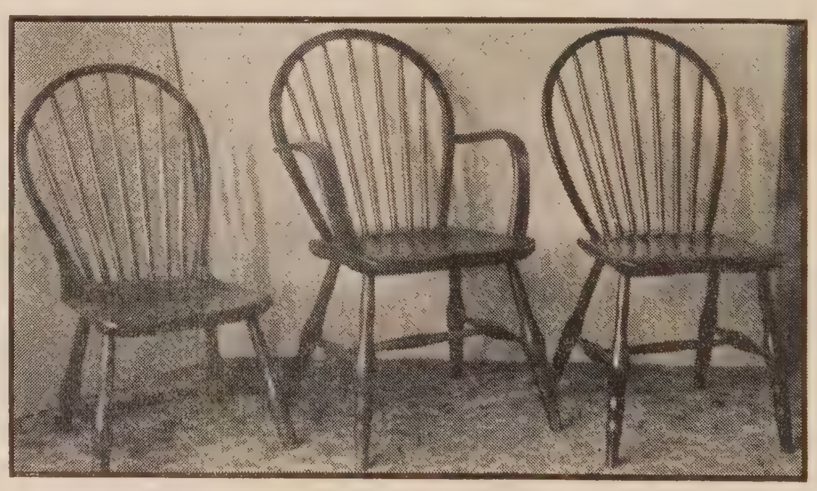
Early Colonial Section

The early colonial section is comprehensive, as is to be expected from a district which added war to the normal hardships of pioneering. Some of the units raised from the settlers were in action again and again, and at Mahoetahi one of them charged with the bayonet in line with the Imperial soldiers.

Portraits of the pioneers under the original settlement of the Plymouth Company (later incorporated in the New Zealand Company) and of settlers from other early ships are prominent, and there are numerous paintings, sketches, and maps of early New Plymouth and the infant province.

Clocks, tool-chests, trunks, and china brought in the William Bryan, the Amelia Thompson, and other immigrant ships are there, but no furniture; the ships lacked space to carry it. However, there are examples of the chairs made of New Zealand timber by William Sanders, passenger by the Oriental, which reached New Plymouth on November 7, 1841. Sanders had spent some years in New England, where he learnt the craft of chairmaking in American woods. He practised his craft in New Plymouth in the 1840's and 1850's, making many beautiful chairs and so adding distinction as well as comfort to the humbly furnished homes of many Taranaki colonists.

The illustration below shows three chairs belonging to Dr. H. D. Skinner, which are similar to those in the Taranaki Museum. These chairs, simple in design and made in three sizes like the belongings of the bears in the folk tale, have been used for more than 100 years, the rata, pukatea, and titoki from which they are made being well polished by use. Such is the quality of the timber and such the craftsmanship of William Sanders that there is all likelihood they will be of service for another century or two at least.



[*Campbell Photography photo.*

Three chairs made by William Sanders. These belong to Dr. H. D. Skinner and are similar to those in the Taranaki Museum.

PATCHWORK has two basic appeals: One is to thrift, because old materials and otherwise-unusable scraps are transformed into attractive articles; the other is to the artistic and creative talents, for the fragments are not merely "used up," but when arranged with care, following traditional patterns or original designs, they form a new and charming whole. Quilts made many years ago for reasons of economy have become treasured family heirlooms in many cases because of their fine workmanship and the feeling for pattern and colour displayed. Like many of the crafts once derided as old fashioned, patchwork is becoming popular with the modern needlewoman and in the modern home. Prejudice against it is often the result of seeing some unattractive sample which doubtless is useful but which has been made hastily and in ignorance of the rules. For, though patchwork may appear the quintessence of haphazardry, observance of definite working techniques is necessary for success. Those techniques are the subject of this article by Norma K. Metson, Rural Sociologist, Department of Agriculture, Wellington.

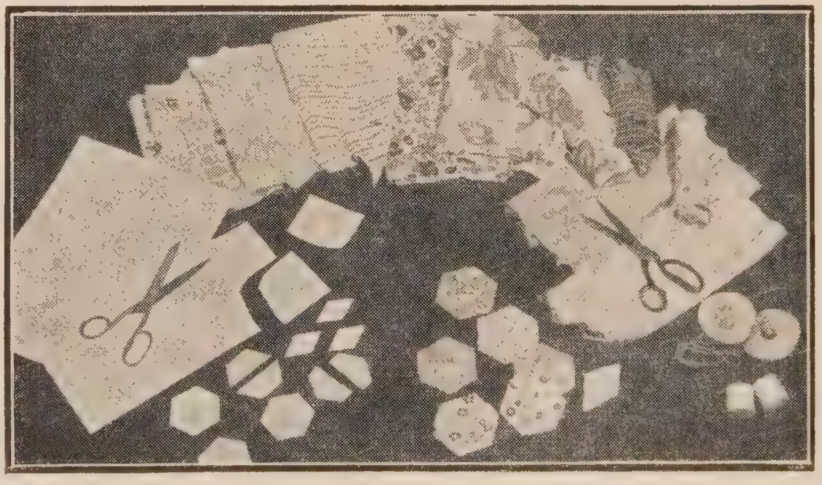
THE patchwork quilt is traditional, but if a quilt is too big an undertaking for a beginner, a cot cover or cushion cover is suitable. Knitting or sewing bags, table mats, and nightdress or handkerchief cases are other appropriate small articles, and patchwork fabric warmly interlined makes a good dressing gown.

Materials

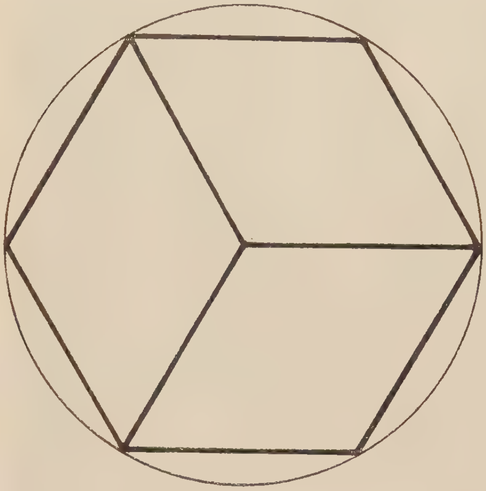
The scrap-bag and old-clothes cupboard of most families will produce sufficient pieces for a patchwork of considerable size, but if home resources are lacking, friends can usually be relied on for small contributions. Odd corners left from cutting out, a piece a foot square, or a long strip a few inches wide make valuable additions, and the donor afterward has the fun of finding her pieces in the finished article. Children, too, in later years are delighted over the preservation of scraps from favourite but long-worn-out frocks

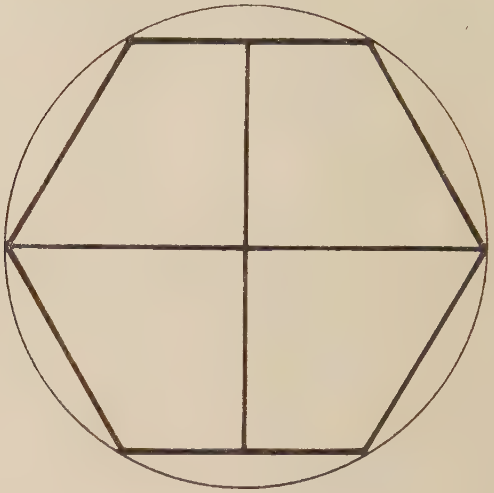
Cottons and linens are easier to work with than silks and synthetics, and firm, closely woven materials are better than those which slip and fray easily. Materials should be colour fast or washed sufficiently to prevent any risk of colours running. Silks and cottons or washable and unwashable materials should not be mixed, and weights and textures should be similar. Small, dainty patterns blend more readily and are more interesting than larger ones. Colours which are soft and somewhat faded require less care in placing and matching than very bright and vivid ones.

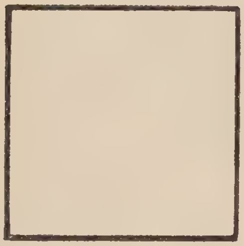
Lining is necessary for all patchwork. For a quilt old sheeting or calico may be dyed a matching colour, or sateen or other lightweight, plain-coloured cotton may be used. A dressing gown gains extra warmth from a flannelette or woollen lining or interlining.

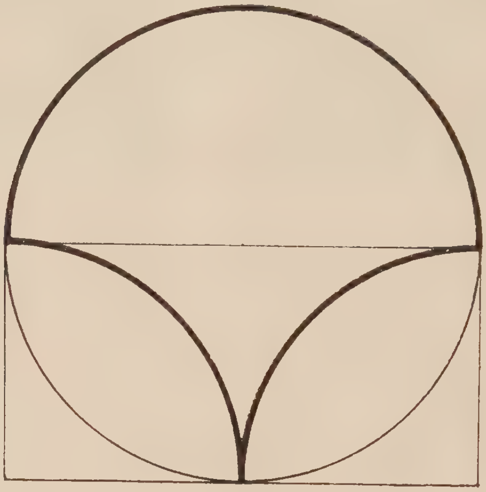


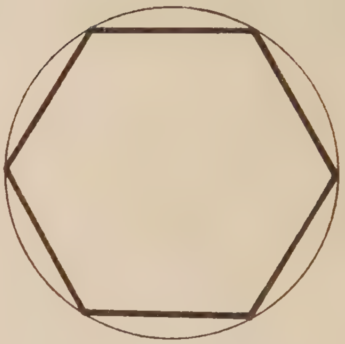
PATTERNS FOR UNITS USED IN PATCHWORK (actual size)

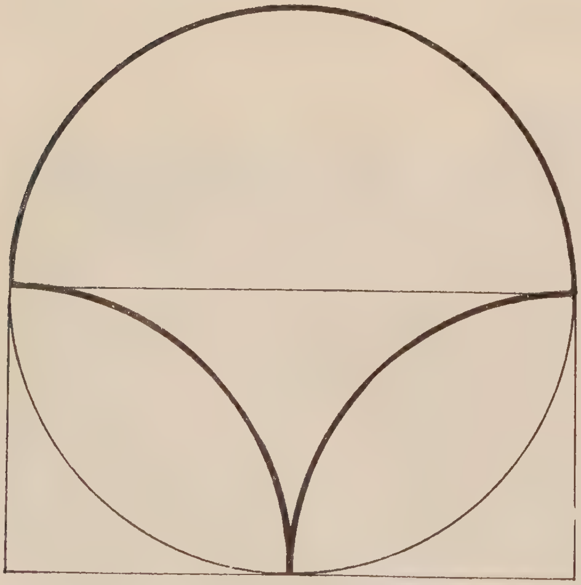


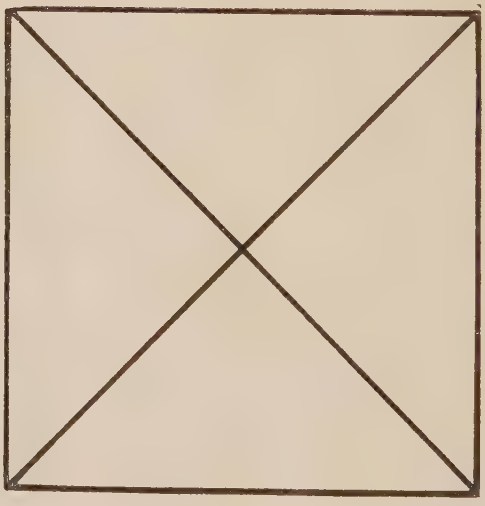


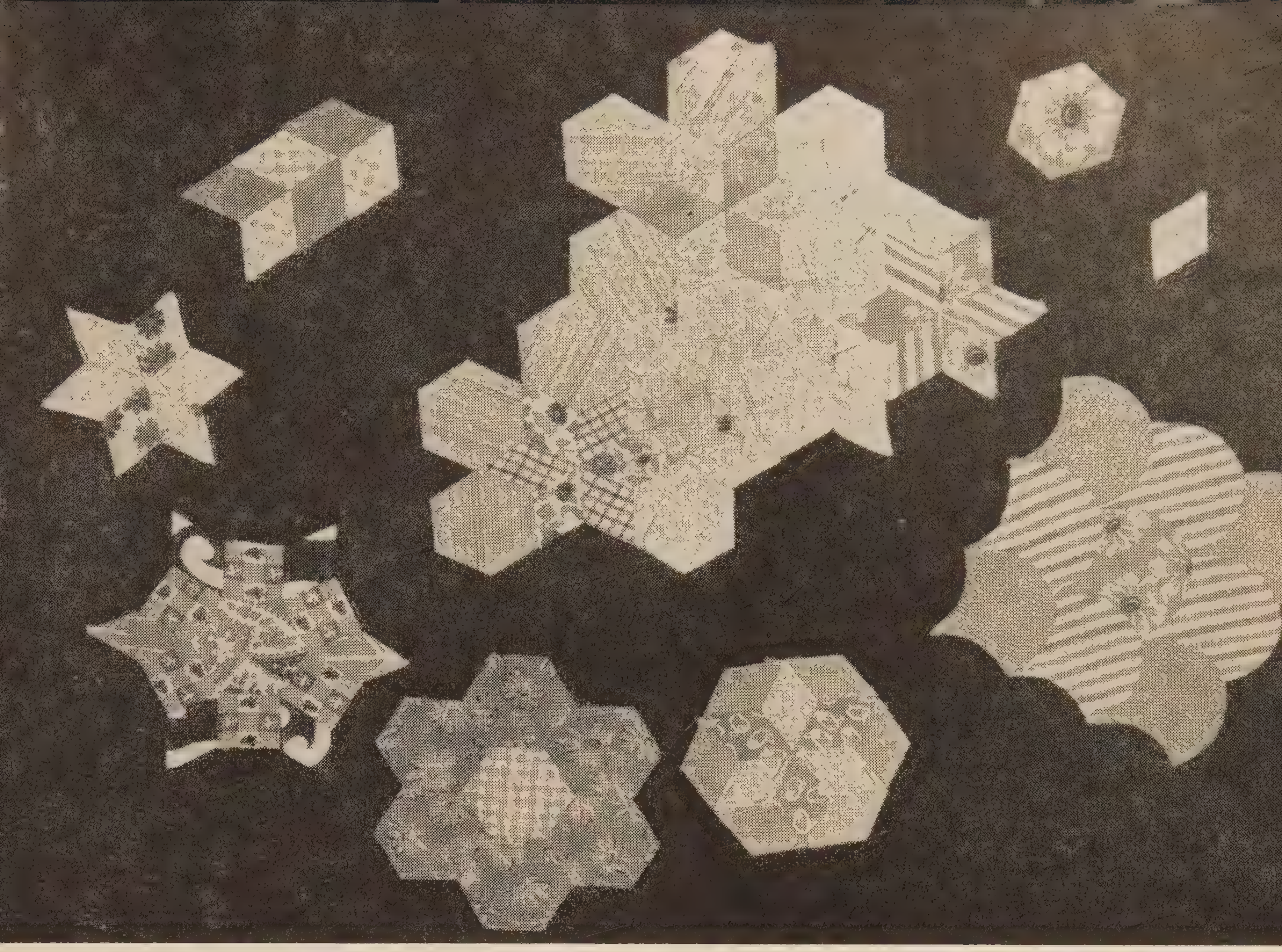












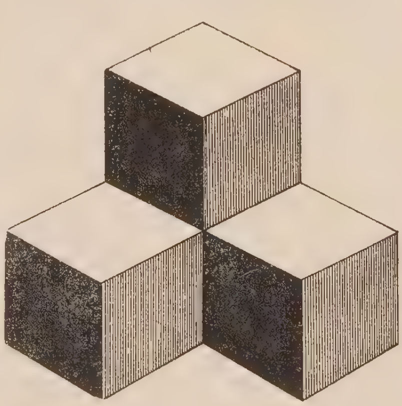
Single units are combined to form a variety of designs. Tacking threads and cardboard backings are still in place.

The guiding shapes must be cut from thin card or stiff paper, and a pair of scissors which can be used without qualms is best for this job. Considerable quantities of tacking cotton are used, so it may be wise to buy a reel of cheap tacking thread. Both thread and needle used for tacking must be fine or the material or card may be damaged. A shallow box for storing paper, cut-out patches, and scraps to be used is very convenient. Patches ready for use can be kept in old window envelopes or pinned or threaded together in groups according to pattern and shape.

Thread for sewing may be white or a neutral colour used for all shades or may be chosen to match the dominant or background colour of the area being worked. Stranded embroidery cotton in the dominant colour may be used for working decorative outline stitches round the patches on the right side; herringbone and feather stitch are the most usual for this.

Units and Patterns

Conventional patchwork is based on the repetition of regular units which can be fitted together to form a flat surface. The standard units are the hexagon, the square, and the scale. The square can be divided into triangles and the hexagon into diamonds or triangles or into halves. The scale is based on a circle, and with it half circles and half scales can be used to make a straight-edged finish. The diagram on the opposite page illustrates these units, actual size, and the photograph on this page shows how the units can be combined into characteristic designs. Hexagons and squares are easier to handle in working than the units which have sharp corners. The whole fabric may be built up by treating each unit as a separate entity, or it may be worked into a regular pattern of shapes and backgrounds, panels and borders.



Placing diamonds of three colours as shown forms a pattern giving an illusion of solid blocks.

Attractive simple patterns are the star (six diamonds) or the flower (seven hexagons) placed at regular intervals on a plain or lightly patterned background. An effect of solid blocks can be attained by using three diamonds, one light, one medium, and one dark in colour, to make up hexagons, arranging them as shown in the diagram. If a symmetrical effect is desired in the pattern, working from the centre outward is the most satisfactory method, but perfect symmetry is unimportant provided that there is balance of colour, pattern, and design.

Panels and borders add to the effectiveness of large pieces of work, as they can be used to make a transition between colour schemes or types of arrangement, thus breaking up the whole into more manageable parts. As the article grows it becomes more difficult to handle, so small sections of the pattern or background can be completed independently, then sewn together.

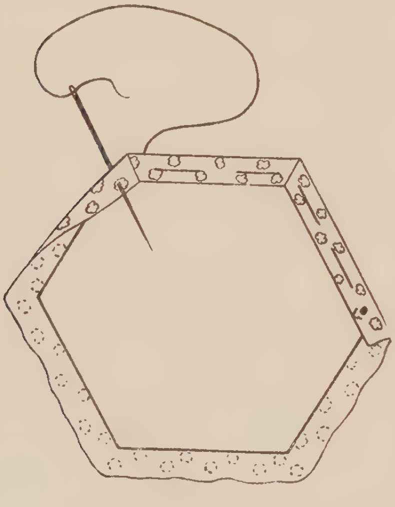
CUTTING AND JOINING PATCHWORK

A cushion cover made from 3in. squares of material joined by machine.

Cutting Out

Make an accurate paper pattern of each unit that is to be used, then cut 10 or 12 replicas of these patterns from stiff paper or thin cardboard. The original pattern must be used each time, as small inaccuracies in cutting, if repeated, add up to considerable distortion. Cut a new paper pattern when the one in use becomes torn or misshapen. Patches must be cut from the same pattern, allowing ¼in. turnings all round.

Each patch is then placed right side down with a paper shape on it, the turning allowance is folded back over the paper, and patch and paper are tacked together with a fine needle and a long thread. Take care that the corners are kept sharp and well shaped.



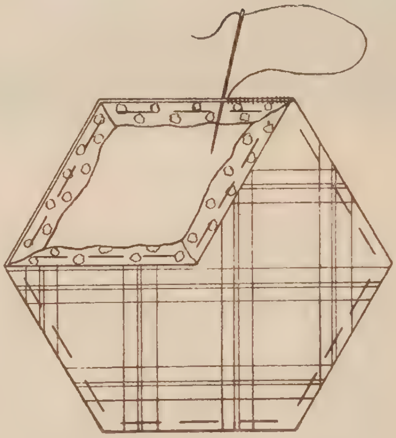
Tacking a patch to the stiff paper backing

Joining the Pieces

The covered pieces are joined by placing them right sides together and overcasting along the edges, stitching through the material only—not through the paper. When several patches are surrounded on all sides the tacking threads are pulled out and the paper backings removed. These backings can be re-used until they become torn or bent. The work should be pressed at intervals on the wrong side after the backings have been removed so that the turnings stay flat and neat.

Patchwork may be designed so that a finished border effect is incorporated in the pattern, or a binding of plain material can be used. For a bedspread the area covering the bed may be patchwork and the side and end pieces plain material frilled or pleated. Linings can be machined on after careful tacking or slipstitched into position by hand.

Though frowned on by the true craftswoman, machine sewing can be used instead of the time-consuming handwork when simple patchwork entirely of squares or rectangles is being made. Accuracy is then essential in cutting the pieces and in keeping the seam allowances regular when sewing, otherwise the corners will not meet neatly and the effect will be spoilt. Patches must be cut on the straight grain of the material or they will stretch out of shape.



Patches are joined right sides together and overcast along the edges.

Time and Patience Needed

A patchwork article, especially a large one, is not something to be made in an evening. It requires time and patience, but once begun the work becomes fascinating. Cutting shapes and patches, covering the pieces, and sewing them together are all jobs which can be picked up in odd moments if the materials are kept at hand. Though the processes involve repetition, matching materials and working out the pattern prevent the work from becoming monotonous, and a sense of achievement comes with each section completed.

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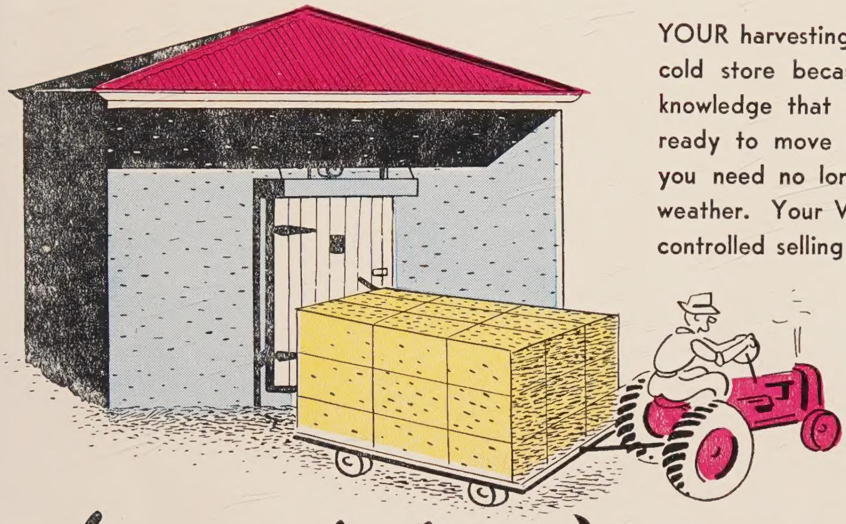

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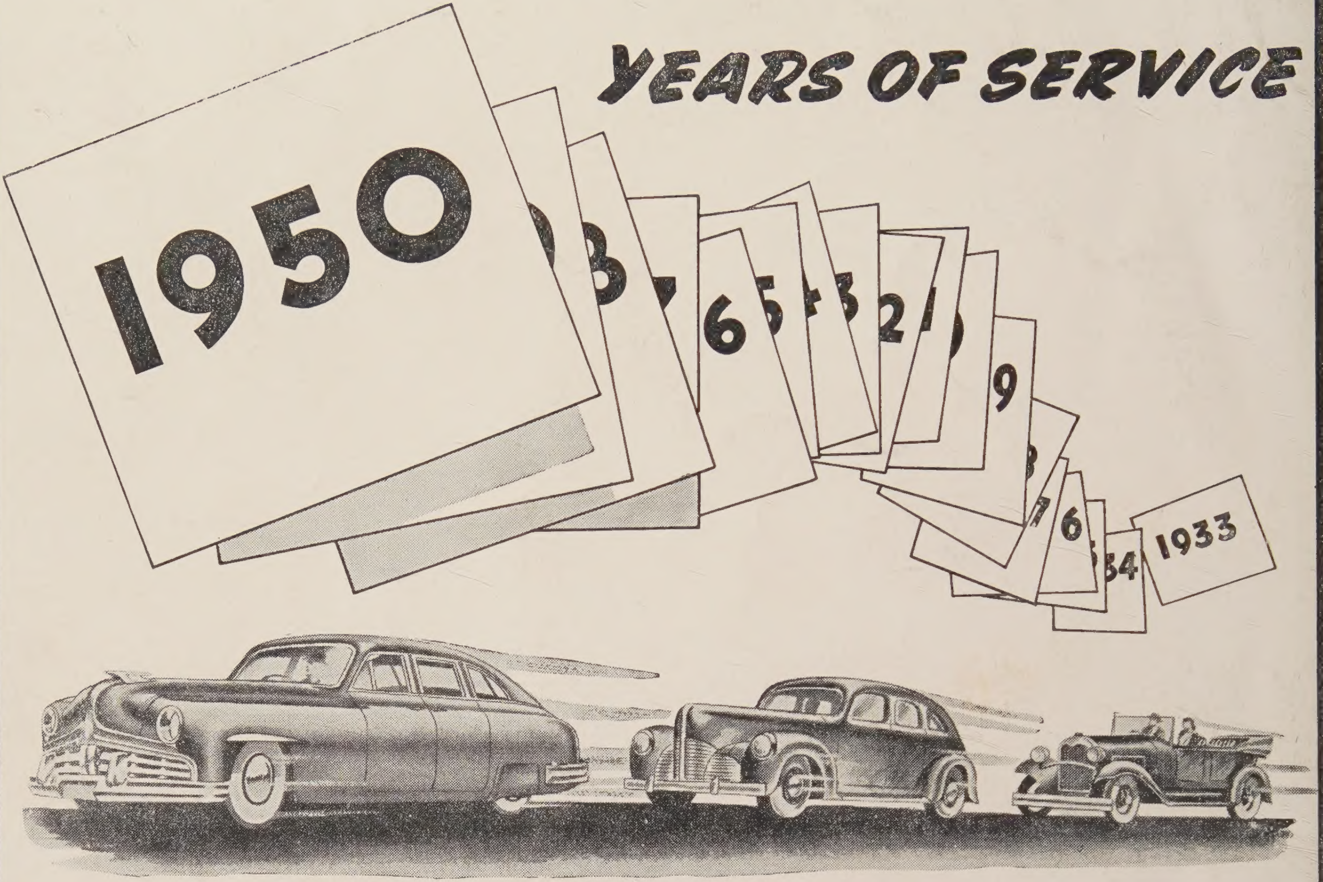

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